

**AN OVERVIEW OF THE NATIONAL OCEANIC
AND ATMOSPHERIC ADMINISTRATION
BUDGET REQUEST FOR FISCAL YEAR 2015**

HEARING
BEFORE THE
SUBCOMMITTEE ON ENVIRONMENT
COMMITTEE ON SCIENCE, SPACE, AND
TECHNOLOGY
HOUSE OF REPRESENTATIVES
ONE HUNDRED THIRTEENTH CONGRESS

SECOND SESSION

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**AN OVERVIEW OF THE NATIONAL OCEANIC
AND
ATMOSPHERIC ADMINISTRATION BUDGET
REQUEST FOR FISCAL YEAR 2015**

WEDNESDAY, APRIL 30, 2014

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Subcommittee met, pursuant to call, at 10:15 a.m., in Room 2318 of the Rayburn House Office Building, Hon. David Schweikert [Chairman of the Subcommittee] presiding.

LAMAR S. SMITH, Texas
CHAIRMAN

EDDIE BERNICE JOHNSON, Texas
RANKING MEMBER

**Congress of the United States
House of Representatives**

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

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Subcommittee on Environment

***An Overview of the National Oceanic and Atmospheric Administration
Budget Request for Fiscal Year 2015***

Wednesday, April 30, 2014
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building

Witnesses

The Honorable Kathryn Sullivan, Undersecretary for Oceans and Atmosphere, U.S. Department
of Commerce, and Administrator, National Oceanic and Atmospheric Administration

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON ENVIRONMENT

HEARING CHARTER

*An Overview of the National Oceanic and Atmospheric Administration
Budget Request for Fiscal Year 2015*

Wednesday, April 30, 2014
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building

Purpose

The Subcommittee on Environment will hold a hearing entitled *An Overview of the National Oceanic and Atmospheric Administration Budget Request for Fiscal Year 2015*, on Wednesday, April 30, 2014, in Room 2318 of the Rayburn House Office Building. The purpose of the hearing is to examine the Administration's Fiscal Year 2015 budget request for the National Oceanic and Atmospheric Administration (NOAA).

Witness List

- **The Honorable Kathryn Sullivan**, Undersecretary for Oceans and Atmosphere, U.S. Department of Commerce, and Administrator, National Oceanic and Atmospheric Administration

Background

The President's fiscal year (FY) 2015 budget request for the National Oceanic and Atmospheric Administration (NOAA) is \$5.49 billion, a 3.2 percent increase above the FY 2014 enacted levels.

NOAA's core mission and activities include weather forecasting, climate prediction, and management of fisheries, coastal and ocean resources, as well as cross-cutting research to support and advance these operational areas. NOAA carries out this mission through five major line offices:

- **National Ocean Service (NOS)**, responsible for mapping and charting coastal areas and providing other navigation support services;
- **National Weather Service (NWS)**, responsible for weather forecasts and warnings;
- **National Environmental Satellite, Data and Information Service (NESDIS)**, responsible for development and operation of satellites that monitor and transmit data for weather forecasting, climate prediction, space weather forecasting, and earth and ocean science research;

- **Office of Oceanic and Atmospheric Research (OAR)**, responsible for research in support of most NOAA missions including atmospheric, coastal, and oceanic sciences, climate and air quality research, ecosystem research, and fisheries and marine mammal research; and
- **National Marine Fisheries Service (NMFS)**, responsible for stewardship of living marine resources through the conservation, management, and promotion of healthy ecosystems.

Table 1 shows the primary accounts or line offices of NOAA's budget.

Table 1: NOAA FY 2015 Budget Request (dollars in millions)

Account	FY13 Spend Plan	FY14 Enacted	FY15 Request	FY15 Request versus FY14 Enacted	
				\$M	% change
National Ocean Service	468.3	498.7	519.4	20.7	4.2%
Oceanic and Atmospheric Research	369.4	426.8	462.2	35.4	8.3%
National Weather Service	953.6	1,067.2	1,063.3	-3.9	-0.4%
National Environmental Satellite Data Information Service	1,864.8	2,083.1	2,247.9	164.8	7.9%
National Marine Fisheries Service	882.5	999.1	916.8	-82.3	-8.2%
Program Support	456.9	481.1	517.9	36.9	7.7%
Adjustments and Transfers	-247.7	-233.5	-230.9	2.5	-1.1%
Totals:	4,747.8	5,322.5	5,496.7	174.2	3.3%

National Weather Service (NWS)

NWS provides weather, hydrologic, and climate forecasts and warnings for the United States, adjacent waters, and ocean areas, and maintains a national infrastructure of observing systems that gather and process data worldwide from the land, sea, and air. The FY 2015 request for NWS is \$1.06 billion, a decrease of \$3.9 million below FY 2014 levels.

The budget request includes a proposal for restructuring its budget programs, projects, and activities (PPA) as part of a broader effort to evolve the NWS to deliver more efficient, responsive, and advanced operations. The proposal supports NWS' Weather-Ready goal by aligning the office budget with function and performance to provide greater transparency.

National Environmental Satellite, Data, and Information Service (NESDIS)

The President's budget request for the National Environmental Satellite, Data, and Information Service (NESDIS) is \$2.25 billion, a \$164 million increase over FY 2014 enacted levels. The majority of this request is for procurement and acquisition under two satellite programs, the Joint Polar Satellite System (JPSS) and the Geostationary Operational Environmental Satellite R-Series (GOES-R).

Oceanic and Atmospheric Research (OAR)

The Office of Oceanic and Atmospheric Research (OAR) is the primary research arm of NOAA, conducting the scientific research, environmental studies, and technology development necessary to improve NOAA operations. OAR activities are carried out at NOAA and via extramural research activities at thirty National Sea Grant colleges and universities. The Administration's FY2015 budget request for OAR is \$462.2 million, a \$35.4 million increase above the FY2014 level. The President's FY2015 budget request for climate research at NOAA is for \$188.3 million, a \$31.8 million increase above FY2014 enacted levels. The Administration is requesting \$84.9 million for weather and air chemistry research, an increase of \$3.7 million from FY2014 enacted levels. The Administration is requesting \$163.5 million for FY2015, a \$3 million decrease below FY2014 enacted levels.

National Ocean Service (NOS)

The National Ocean Service (NOS) protects the National Marine Sanctuaries and advocates coastal and ocean stewardship. The NOS also introduced electronic nautical charts that interface with Global Positioning Systems (GPS) to enhance the safety and efficiency of navigation of U.S. waterways. The President's FY 2015 request of \$519.4 million would increase overall funding for NOS programs by \$20.7 million over the FY 2014 enacted level.

Program Support

The Program Support line office supports corporate services and agency management. This includes the office of the Under Secretary, the Office of the Chief Financial Officer, the Program, Planning and Integration Office, and the NOAA Education Program. Overall, the Administration requests a total of \$517.9 million for the Program Support account, a \$36.9 increase over the FY14 enacted level.

Chairman SCHWEIKERT. The Subcommittee on Environment will come to order.

Good morning, everybody. This should actually be hopefully an interesting hearing and the doctor has actually been one of the Committee's favorites because we have considered you to always be very forthcoming in discussions, so appreciate having you here.

You know, today's hearing is entitled "An Overview of the National Oceanic and Atmospheric Administration Budget Request for the 2015 Fiscal Year." In front of you are packets containing the written testimony, biographies, truth-in-testimony disclosures of today's witness.

I would like to recognize myself for a few minutes here and we will just get ourselves going.

NOAA's 2015 budget request is \$5.5 billion, which is an increase of, what, 3.3 percent from the 2014. Some of the questions that I believe you will be hearing today are going to revolve around the satellite program and continuing to increase as a percentage of your total budget. My understanding now is it will consume about 40 percent of NOAA's budget, and in the 2015 budget request, there is \$2.2 billion for NOAA's satellite office. The two main satellite systems are the Joint Polar System—I think we refer to it as, what, JPSS—and the Geostationary Operational Environmental Satellite, the GOES. Two satellites provide up to 90 percent of the critical data needed to make our weather forecast.

I would like some discussion, whether it be from questions or you, Dr. Sullivan. Is there going to be a gap and how will that gap be fulfilled? And are there—what optionality is there? Is there a private optionality and how long they expect a gap in that data?

The second thing that I believe you will have multiple questions is in regards to the supercomputing power and the ability to manage the scale and the size of the data you have considering the current holds that are out there because of the contract with IBM and the sale to China. And I know many of us would like to discuss with you what options are there. And Dr. Sullivan, as you are speaking, I would love for you to go a little further from our previous conversation of sharing with us a sort of the mechanics you already have in place with universities and private industry of management of data, speed of data, and total bulk time that you have for your supercomputing and your collection of crowd data.

And with that, I would like to recognize Ms. Bonamici, the Ranking Member.

Ms. BONAMICI. Thank you very much, Mr. Chairman, for holding this morning's hearing to examine the President's budget request for NOAA, the National Oceanic and Atmospheric Administration.

Welcome back, Dr. Sullivan, and I congratulate you on being named one of Time magazines 100 most influential people. That is a very nice article and some very nice words from Senator Glenn.

As we face—find ourselves facing one of the biggest environmental challenges of our time, climate change, we are in need of your national leadership and advocacy on this issue, as well as other important issues under NOAA's jurisdiction. I thank you very much for being here and I am looking forward to today's discussion about NOAA's priorities.

NOAA is a critically important agency with helping our communities, our economy, and our ecosystems remain healthy and resilient in the face of an ever-shifting environment. NOAA conducts state-of-the-art research to understand and predict changes in weather and climate, as well as of the oceans and along our coasts. The science used to create products and services that inform decision-making by a diverse set of stakeholders, NOAA helps my constituents along the coast of Oregon decide when it is safe to go out fishing. They aid my constituents in Yamhill County as they grow grapes that become Oregon's world-famous Pinot Noir. They assist people in Oregon and across the country in planning for and responding to extreme weather and climate events like heavy precipitation, flooding, and the devastating storms impacting the South and the Midwest. And NOAA helps all of our constituents in similar ways.

I am pleased that the President's budget request recognizes the importance of NOAA and gives the agency a prominent role in the Administration's efforts to prepare the United States for the impacts of climate change. The budget makes critical investments in NOAA's observational infrastructure, which includes environmental satellites that not only serve as the foundation for our weather forecast but also provide critical information about the opening of the Arctic Circle to maritime commerce and energy development.

The proposed budget also recognizes that the demand for climate data and other information, especially at the regional level, is growing. It seeks to address this need for regional information and tools by expanding NIDIS, the National Integrated Drought Information System, to include, among other areas, the Pacific Northwest; by improving our understanding of ocean acidification, which will help the shellfish industry adapt and the fishing industry prepare and by operationalizing ecological forecasting of harmful algal blooms that pose a threat to human health.

Overall, I am pleased with the President's budget request for NOAA but do have some concerns I would like to briefly mention. Specifically, as the Chairman noted, although the Joint Polar Satellite System, or JPSS, seems to be on track and in fact it was recently announced that the first of five instruments that will fly on JPSS-1 is ready for installation, I do remain concerned about the risks associated with the likely gap in polar data and NOAA's plans to mitigate the impact of the gap. I hope to gain a better understanding today of the agency's efforts to implement a mitigation plan.

Additionally, as you know, off the West Coast lies the Cascadia Subduction Zone when—unfortunately not if but when—another earthquake occurs on this fault, it will trigger a massive tsunami with potentially catastrophic results. I am sure you can understand my concern and that of my constituents with the proposed elimination of education and awareness grants through the National Tsunami Hazard Mitigation Program, grants that are designed to help communicate threats to vulnerable communities and assist in the development of response strategies.

I would like to hear from you, Dr. Sullivan, about how NOAA is working to increase resiliency in communities threatened by

tsunamis and I look forward to working with you as we develop legislation to reauthorize the Tsunami Warning and Education Act.

Mr. Chairman, thank you again for holding this hearing. I look forward to working with you and our colleagues to ensure that NOAA has the resources it needs to fulfill its critical mission to protect lives and property and to enable commerce through science, service, and stewardship.

Dr. Sullivan, thank you again for being here and for your service to the Nation.

Mr. Chairman, thank you and I yield back the balance of my time.

[The prepared statement of Ms. Bonamici follows:]

PREPARED STATEMENT OF SUBCOMMITTEE ON ENVIRONMENT
RANKING MINORITY MEMBER SUZANNE BONAMICI

Thank you, Mr. Chairman for holding this morning's hearing to examine the President's budget request for NOAA, the National Oceanic and Atmospheric Administration. I'd like to welcome back Dr. Sullivan and congratulate her on being named one of Time Magazine's 100 most influential people. (Those are some very nice words from Senator John Glenn). As we find ourselves facing one of the biggest environmental challenges of our time—climate change—we're in need of your national leadership and advocacy on this issue and I thank you very much for being here. I'm looking forward to today's discussion about NOAA's priorities in the proposed budget.

NOAA is a critically important agency tasked with helping our communities, economy, and ecosystems remain healthy and resilient in the face of an ever-shifting environment. NOAA conducts state of the art research to understand and predict changes in weather and climate, as well as in the oceans and along our coasts. This science is used to create products and services that inform decision-making by a diverse set of stakeholders.

NOAA helps my constituents along the coast of Oregon decide when it's safe to go out fishing; they aid my constituents in Yamhill County as they grow the grapes that become Oregon's world-famous pinot noir; and they assist people in Oregon, and across the country in planning for, and responding to, extreme weather and climate events like heavy precipitation, flooding, and the devastating storms impacting the south and Midwest. And NOAA helps all of our constituents in similar ways.

I am pleased that the President's budget request recognizes the importance of NOAA and gives the agency a prominent role in the Administration's efforts to prepare the United States for the impacts of climate change. The budget makes critical investments in NOAA's observational infrastructure, which includes environmental satellites that not only serve as the foundation for our weather forecasts, but also provide critical information about the opening of the Arctic Circle to maritime commerce and energy development.

The proposed budget also recognizes that the demand for climate data and other information, especially at the regional level, is growing. It seeks to address this need for regional information and tools by expanding the National Integrated Drought Information System (or NIDIS) to include, among other areas, the Pacific Northwest; by improving our understanding of ocean acidification, which will help the shellfish industry adapt and the fishing industry prepare; and by operationalizing ecological forecasting of harmful algal blooms that pose a threat to human health.

Overall, I am pleased with the President's budget request for NOAA, but I do have some concerns that I would like to briefly mention. Specifically, although the Joint Polar Satellite System or JPSS seems to be on track—and in fact, it was recently announced that the first of five instruments that will fly on JPSS-1 is ready for installation—I remain concerned about the risk associated with a likely gap in polar data and NOAA's plans to mitigate the impact of this gap. I hope to gain a better understanding today of the agency's efforts to implement a mitigation plan.

Additionally, as you know, off the coast of Oregon lies the Cascadia Subduction Zone. When—unfortunately, not if—another earthquake occurs on this fault, it will trigger a massive tsunami with potentially catastrophic results. I am sure you can understand my concern with the proposed elimination of education and awareness grants through the National Tsunami Hazard Mitigation Program, grants that are designed to help communicate threats to vulnerable communities and assist in the

development of response strategies. I'd like to hear from Dr. Sullivan about how NOAA is working to increase resiliency in communities threatened by tsunamis, and I look forward to working with you as we develop legislation to reauthorize the Tsunami Warning and Education Act.

Mr. Chairman, thank you again for holding this hearing and I look forward to working with you and our colleagues to ensure that NOAA has the resources it needs to fulfill its critical mission to protect lives and property and to enable commerce through science, service, and stewardship.

Dr. Sullivan, thank you again for being here today and for your service to the Nation.

Mr. Chairman, I yield back the balance of my time.

Chairman SCHWEIKERT. Thank you, Ranking Member Bonamici.

Now, we would like to recognize Chairman Smith, the Chairman of the Full Committee, for unlimited amount of time.

Chairman SMITH. Thank you, Mr. Chairman, and thank you, Administrator Sullivan, for being with us here today. And let me congratulate you on being named one of Time magazine's 100 most influential people of 2014.

Our Committee oversees NOAA's more than \$5 billion budget. NOAA is responsible for critical science activities related to oceans, weather, and climate.

Today, we are here to discuss the President's Fiscal Year 2015 budget request for NOAA of \$5.5 billion, a 3.3 percent increase over 2014 levels. While I support many of these areas of research and forecasting, other parts of the President's budget request are harder to justify. For example, the Administration's request substantially increases funding for climate research and for some non-critical climate satellite activities. But funding for the National Weather Service and weather forecasting research is essentially flat.

Almost \$190 million is requested for climate research, more than twice the amount dedicated to weather research. There are 13 other agencies that are involved in climate change research, and according to the Congressional Research Service, they have spent \$77 billion between 2008 and 2013.

Unfortunately, NOAA's models do not match up with observed changes and have not predicted regional climate changes. And NOAA's website, Climate.gov, includes non-peer reviewed materials for children that in my view promote climate alarmism. These misguided priorities are troubling. Instead of hyping climate alarmism, NOAA should focus its efforts on other areas such as improving weather forecasting.

America's leadership has slipped in severe weather forecasting, and European weather models routinely predict America's weather better than we can.

I am also concerned that NOAA's satellite division now comprises over 40 percent of the total budget request for the agency at over \$2 billion. In 2008, the satellite budget came in under \$1 billion and was roughly 1/4 of NOAA's overall spending. The budget for this office has ballooned dramatically over the last decade. For instance, the Joint Polar Satellite System program has been plagued with runaway costs and mismanagement, which raises questions about future funding for the project and its expected launch dates.

Even NOAA's own optimistic schedule would still leave us with a gap for critical weather data in the middle part of this decade. Meanwhile, the chronic cost overruns of NOAA's satellites have

forced significant reductions in funding for important activities in areas such as oceans, fisheries, and weather.

NOAA is a mission-oriented agency, and this Committee supports these core priorities. We face fiscal constraints that force us to make difficult choices about our science and technology resources. Rather than devoting limited dollars to duplicative and alarmist climate change activities, NOAA in my view should focus on research and forecasting capabilities that do in fact protect lives and property.

Thank you, Mr. Chairman. I will yield back, but on the way to yielding back, let me apologize to the Administrator. I have a Judiciary Committee markup that began 25 minutes ago I am going to have to tend to and I hope to return in time to ask questions. So I yield back. Thank you.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF FULL COMMITTEE CHAIRMAN LAMAR S. SMITH

Thank you Chairman Schweikert, and thank you Administrator Sullivan for being with us here today. Let me congratulate you on being named one of Time Magazine's 100 most influential people of 2014.

Our Committee oversees NOAA's more than five billion dollar budget. NOAA is responsible for critical science activities related to oceans, weather and climate.

Today we are here to discuss the President's FY15 budget request for NOAA of \$5.5 billion, a 3.3 percent increase over 2014 levels. While I support many of these areas of research and forecasting, other parts of the President's FY15 budget request are harder to justify.

For example, the Administration's request substantially increases funding for climate research and for some non-critical climate satellite activities. In comparison, funding for the National Weather Service and weather forecasting research is essentially flat.

Almost \$190 million is requested for climate research, more than twice the amount dedicated to weather research. There are 13 other agencies that are involved in climate change research, and according to the Congressional Research Service, they have spent \$77 billion between 2008 and 2013.

For example, in addition to NOAA, NASA, the Department of Energy, and the National Science Foundation also carry out climate change modeling.

Unfortunately, NOAA's models do not match up with observed changes and have not predicted regional climate changes. And NOAA's website, Climate.Gov, includes non-peer reviewed materials promoting climate alarmism for children.

These misguided priorities are troubling. Instead of hyping climate alarmism, NOAA should focus its efforts on other areas such as improving weather forecasting.

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For instance, the Joint Polar Satellite System program has been plagued with runaway costs and mismanagement, which raises questions about future funding for the project and its expected launch dates.

Even NOAA's own optimistic schedule would still leave us with a gap for critical weather data in the middle part of this decade.

Meanwhile the chronic cost over-runs of NOAA's satellites have forced significant reductions in funding for important activities in areas such as oceans, fisheries, and weather.

NOAA is a mission-oriented agency, and this Committee supports these core priorities. We face fiscal constraints that force us to make difficult choices about our science and technology resources.

Rather than devoting limited dollars to duplicative and alarmist climate change activities, NOAA should focus on research and forecasting capabilities that protect lives and property.

Chairman SCHWEIKERT. Thank you, Mr. Chairman.

Our witness today is Hon. Kathryn Sullivan, Undersecretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration, NOAA. And I want to make sure the Committee also congratulates you on recently being confirmed as the Administrator for NOAA and also being named one of Time magazine's 100 most influential people in 2014, which I think all of us have now mentioned. We all wanted to make sure we got it in. There is no envy there at all.

Previously, Dr. Sullivan served as Assistant Secretary of Commerce for Environmental Observation and Predictions, as well as performing the duties of NOAA's Chief Scientist. She is a distinguished scientist, renowned astronaut, and intrepid explorer. We will later find out what that is. And, Dr. Sullivan, you earned your doctorate in geology.

Dr. Sullivan, you have five minutes and I believe you know the routine, yellow light, talk faster.

**TESTIMONY OF THE HONORABLE KATHRYN SULLIVAN,
UNDERSECRETARY FOR OCEANS AND ATMOSPHERE,
U.S. DEPARTMENT OF COMMERCE;
AND ADMINISTRATOR, NATIONAL OCEANIC
AND ATMOSPHERIC ADMINISTRATION**

Dr. SULLIVAN. Thank you, Mr. Chairman, Ranking Member Bonamici, Members of the Committee.

First, before starting my testimony, I want to express my condolences to all of those who were touched by the severe weather that swept through many States over the past 4 days. Our NOAA forecasters and staff are on the frontlines in such events providing warnings and information to their neighbors—your constituents—that help them avoid, cope with, and become weather-ready in the face of this fearsome power of nature. I am proud of the work they do.

In recent events, they gave stakeholders accurate outlooks 6 days in advance and timely warnings thanks to reliable environmental intelligence our Storm Prediction Center in Norman, Oklahoma, produces. We know there is still more that can be done and I will need your help with that, as I have detailed in my written statement.

I am here today to talk about the President's Fiscal Year 2015 proposal for the NOAA budget. I, like you, believe that NOAA is one of the most important and valuable service agencies in the United States Government. Our enterprise of observing systems, forecasts, and assessments is designed to provide the foresight and information people need to live safely and well on this dynamic planet, and it works. In NOAA we call this information "environmental intelligence" and producing it is at the core of our mission.

The environmental intelligence and related decision support services that NOAA provides are in higher demand today than ever before. From forecasting short-term extreme weather events to providing the data that help ensure safe navigation and the smooth flow of commerce to sustaining and promoting economically viable

fisheries, this budget request makes disciplined and targeted investments to sustain and advance these critical missions.

For now, I would like to emphasize just three important areas—investment areas of the budget. First, NOAA’s global observing systems are the indispensable foundation of our Nation’s environmental intelligence. This budget proposes disciplined, targeted investments in that infrastructure. And I would highlight for the moment NOAA’s fleet of research vessels. Without investments now, our fleet will shrink by 50 percent by 2028, which will severely degrade stock assessments, nautical charting, buoy maintenance, and research. That is why we request funding for a new multiuse ocean survey vessel that can work in any ocean with greater data gathering capability than current NOAA vessels.

Second, communities and businesses are demanding NOAA’s environmental information over many timescales to help them protect assets and plan for the future. We must keep pace with this demand. This budget invests in the data and information services that promote community and economic resilience in advance of and in the aftermath of severe events. In the Fiscal Year 2015 budget, we propose targeted increases that will help build capacity for response and resilience in the critical need areas of coastal inundation and drought, ecological forecasting of harmful algal blooms, and the understanding of potential environmental impacts from increasing commerce in the Arctic.

Third, we must be able to attract and retain the best talent to ensure that NOAA can effectively engage with our partners and efficiently deliver environmental intelligence. To do this, we must invest in our people and the administrative services that support them. I am keenly focused on achieving organizational excellence within NOAA. No business can succeed if its essential support services fall behind the pace and the demand of the outside world. But that is just what has begun to happen at NOAA.

One point to illustrate, as of Fiscal Year 2012, NOAA has one human resources representative serving 150 employees. Looking at comparable agencies like NIST, the Coast Guard, and NASA, NOAA is underfunded by almost 1/3. And our capacity is some—only about—is 40 percent below that of the average U.S. company, according to data recently published in the Wall Street Journal. We must reverse this trend if the agency is to function at the level that our citizens, the Congress, and our customers and partners demand. I look forward to working with the members of this committee and our partners and constituents to achieve the goals we articulate through the implementation of our Fiscal Year 2015 budget.

And I thank you for the opportunity to testify before you today.
[The prepared statement of Ms. Sullivan follows:]

**WRITTEN STATEMENT OF
KATHRYN SULLIVAN, PH.D.
UNDER SECRETARY OF COMMERCE FOR OCEANS AND ATMOSPHERE
AND NOAA ADMINISTRATOR
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE**

**ON THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION'S
FY 2015 BUDGET REQUEST**

**BEFORE THE
SUBCOMMITTEE ON ENVIRONMENT
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES**

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Chairman Schweikert, Ranking Member Bonamici, and members of the Committee, thank you for your leadership and the continued support you have shown for the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). As the Under Secretary of Commerce for Oceans and Atmosphere and the Administrator for NOAA, I am honored to be here to discuss the FY 2015 President's Budget. The FY 2015 budget proposal represents a focused and balanced commitment to our core mission of science, service, and stewardship. The proposal better positions NOAA to help communities across the country safeguard lives and property, prepare for extreme weather events, adapt to a changing world, ensure environmental sustainability, and enhance economic prosperity.

Let me begin with the bottom line: NOAA is one of the most valuable service agencies in the U.S. government. Through our network of observations, forecasts, and assessments, we strive to provide the foresight and information people need to live well and safely on this dynamic planet. At NOAA, we call this information "environmental intelligence," and producing it is at the core of our mission. NOAA was very effective last year providing such information to help American citizens, businesses, and governments make smart decisions on a range of issues on local to global scales. The real testament to NOAA's value is not found in a spreadsheet; it is seen in the services rendered to the American people.

The environmental intelligence and the services NOAA provides are in higher demand today than ever before. Increases in the frequency and severity of extreme weather events mean that NOAA must forecast and respond to these events with skill and accuracy. But the increased demand for our services goes beyond just extreme weather. Our marine transportation system must be more efficient to accommodate growing volume of commerce at our ports. NOAA provides the positioning data, tide and currents information, and nautical charts that ensure safe navigation and keeps commerce flowing. Our marine ecosystems are changing due to climate and other stressors, thereby increasing the need for a greater number of more advanced scientific assessments to sustain and promote economically viable commercial and recreational fisheries, and to ensure that threatened and endangered species are protected.

NOAA's integrated response to extreme events such as droughts, hurricanes, tornadoes, and heat waves demonstrates how our agency leverages its diverse capabilities to support the nation from preparedness to response to recovery: data collected from a spectrum of platforms enables the development of environmental intelligence from science-based models to support a suite of products to provide decision support to individuals, communities, and governments. I thank you for recognizing NOAA as a key agency supporting the preparedness, response, and recovery efforts surrounding extreme events.

The NOAA FY 2015 budget request aims not only to enhance public safety and community resilience, but also to make smart investments via innovative science and research to better position NOAA for the future. This budget request continues efforts to strike the right balance between our oceanic and atmospheric missions, our internal and extramural programs, and our long-range and short-term research investments, while maintaining strong fiscal discipline. Overall this is a strong budget for NOAA, however, you will see decreases in some activities that we have to scale back in order to position the agency for the future and afford the proposed investments.

We appreciate Congress' support in FY 2014. Below we highlight some of our top accomplishments from 2013, many of which we could not have achieved without our partners in the research, industry, and conservation communities.

FY 2013 ACCOMPLISHMENTS

Rebuilt four fish stocks while increasing fishing opportunity. NOAA, in cooperation with commercial and recreational fishermen and fishery management councils, rebuilt the following fisheries in 2013: Southern tanner crab fishery in the Bering Sea, pink shrimp in the South Atlantic, Sacramento River fall Chinook salmon, and South Atlantic black sea bass. In 2013, NOAA reported that 2012 U.S. commercial and recreational landings were the second-highest on record, totaling 9.6 billion pounds and valued at \$5.1 billion.¹

Completed dual-polarization upgrade to weather radar network. In April 2013, NOAA completed deployment of the Dual Polarization (Dual Pol) capability across the nation's Next Generation Weather Radar (NEXRAD) network of 158 Tri-Agency sites. Dual Pol enables more accurate precipitation estimates, improved hail detection, improved rain and snow discrimination, and better detection of tornado debris. This innovation helped increase National Average Flash Flood Warning lead-time from 58 to 64 minutes, allowing people in affected areas more time to take life- and property-saving actions.

Advanced harmful algal bloom detection. NOAA scientists and partners improved field detection of algal species and toxins related to Harmful Algal Blooms (HABs). In Alaska, scientists and partners helped remote communities mitigate the dangers of paralytic shellfish poisoning, a HAB-related illness. In southern California and Maine, scientists researched and enhanced technology to detect harmful HAB-related toxins.

¹ *Fisheries of the United States*, 2012. NMFS Office of Science and Technology. See here: http://www.st.nmfs.noaa.gov/Assets/commercial/fus/fus12/FUS_2012_factsheet.pdf

Continued on pace to improve weather forecasts via new satellite systems. Since its October 2011 launch, Suomi NPP instruments have provided invaluable data for weather forecasting and environmental observations. In addition, the Joint Polar Satellite System (JPSS)-1 and JPSS-2 missions continue to make steady progress. JPSS instruments and ground system represent a new generation of observations and processed data products that will dramatically increase the accuracy, timeliness, stability, and volume of data needed for substantial improvement in weather forecast skill.

Supported Hurricane Sandy recovery. Crews flying in NOAA's King Air turboprop and Twin Otter aircraft surveyed over 1,649 miles of coastline to document coastal damage and impacts to navigation. The data contained in these photos provided emergency and coastal managers with the information they need to develop recovery strategies, facilitate search-and-rescue efforts, identify hazards to navigation and HAZMAT spills, locate errant vessels, and provide documentation necessary for damage assessment through the comparison of before-and-after imagery. NOAA ships *Thomas Jefferson* and *Ferdinand R. Hassler* surveyed harbor and shipping channels to ensure safe navigation.

Advanced understanding of ocean acidification impacts along West Coast. NOAA scientists completed their third biennial cruise along the continental west coast to study the extent of acidification in coastal waters and the resulting impacts on marine life. Preliminary results indicate that the upper 100 meters of the water column in this region have become more corrosive to the shells of marine organisms – as much as a six-fold increase relative to pre-industrial conditions – causing a decline in pteropods, an important food source for juvenile salmon, whales, and numerous other marine organisms. This also poses a risk to the west coast shellfish industry.

FY 2015 BUDGET REQUEST

The NOAA FY 2015 discretionary budget request totals approximately \$5.5 billion. The topline number is an increase of \$174.1 million, or 3.2 percent, over the FY 2014 enacted levels. This budget request continues efforts to strengthen the agency's oceanic and coastal programs, and its internal and extramural programs, all while maintaining fiscal discipline. In the FY 2015 budget, we focus our investments in three areas: 1) critical investments in infrastructure, 2) services that enhance public safety and community resiliency, and 3) innovations that will position NOAA for the future and promote operational excellence. In order to afford investments in these critical areas, difficult decisions had to be made, but I believe that this budget provides clearer portfolio logic, which is a trend I look to continue in the future.

Investing in Mission-Critical Infrastructure

This budget makes investments in infrastructure improvements that are critical to effectively execute NOAA's diverse mission portfolio. NOAA is the only federal agency with the operational responsibility to provide critical and accurate weather, water, ocean, climate, and ecosystem forecasts. Our global observing systems are the foundation of the information and data we provide – without them we are essentially “flying blind” and the level of uncertainty in our forecasts increases at a time when people are demanding more precision. Investments are necessary today to ensure NOAA's fleet of research vessels and observational platforms can continue to provide the environmental intelligence needed to meet our mission and are capable of

gathering data in extreme environments, such as the Arctic.

This budget requests an increase of \$2 million to improve the condition of the NOAA ship fleet by stabilizing capital investment in regular upgrades and repairs. We are also investing in advancements for the Weather-Ready Nation mission by supporting next-generation polar and geostationary satellites. The requested increase for the Geostationary Operational Environmental Satellite R-Series (GOES-R; + \$38.9 million) and the Joint Polar Satellite System (JPSS; + \$95.4 million) supports on-time launch and thus decreases risk to sustained execution of our weather mission. Additional requested increases to support the Weather-Ready Nation initiative include essential IT and physical infrastructure, such as the Ground Readiness Project (+ \$6 million) and NEXRAD Service Line Extension Program (+ \$9.3 million).

The FY 2015 President's Budget request also includes proposals to sustain critical observations, which will help improve the resilience of the nation to immediate hazards and long-term risks. An increase is requested (+ \$4 million) to build upon the coastal LIDAR survey efforts, which will allow for progress towards a national dataset to inform navigation safety, coastal storm preparedness, and stewardship of ecological resources. NOAA requests an increase (+ \$8.0 million) to complete and sustain an observation and analysis system to determine uptake and emissions of greenhouse gases across North America. NOAA will build upon its Atmospheric Baseline Observatories, (+3.0 million) Global Reference Networks for atmospheric composition, and North American Carbon Observation and Analysis System to deliver information on the full suite of greenhouse gas emissions. In addition, NOAA requests an increase to support 3,170 days at sea (+ \$2.9 million) for fishery, hydrographic, and marine ecosystem surveys, and 2,795 flight hours (+ \$1 million) to conduct hurricane reconnaissance and research missions aimed at improving hurricane intensity forecasts. Flights also support water resource surveys that allow water managers and forecasters to more accurately forecast spring melts, droughts, and flooding to meet industrial and agricultural needs.

NOAA's FY 2015 request seeks an increase of \$12 million to strengthen agency support functions and mitigate the risk of non-compliance with the regulatory areas for which the Corporate Services units have agency oversight. Currently, Corporate Services is at a critical staffing breaking point; employment is low compared to historic levels and turnover is high – we need to reverse this trend if the agency is to function at the level that Congress and our partners demand. For example as of FY 2012, NOAA has one Human Resource (HR) representative for every 150 employees. NIST has one HR representative for every 79 employees. This increase is critical to attract and retain the best talent; proficiently execute our mission; and operate with both high efficiency and optimal effectiveness.

Strengthening Scientific and Programmatic Innovation

NOAA is a service agency – but one that is supported by some of the best science in the world. This budget continues to invest in the research and development needed today for the innovation of tomorrow. Developing the latest technological advancements and promoting a fundamental understanding of our planet will keep our products and services viable, improve cost efficiency and management effectiveness, maximize economic opportunity, and leverage our partnerships with external stakeholders. From making advancements in sustainable fisheries management to evolving NOAA's National Weather Service (NWS), this budget includes key investments to strengthen, support, and foster innovation within the organization.

NOAA is proposing investments to advance sustainable fisheries management. An increase of \$4 million is requested for electronic monitoring and reporting, which will support development and implementation of this technology across the country. These electronic solutions will improve the timeliness, quality, integration, and accessibility of data for fishery managers, stock assessment scientists, the fishing industry, and other key stakeholders. The goal is to deliver cost-effective solutions that enhance monitoring of catch and bycatch in U.S. fisheries. In addition, an increase of \$2.5 million is requested to improve timeliness and accuracy of stock assessments, by incorporating ecosystem information (e.g., climate, predator-prey dynamics) and using advanced technologies (e.g., remote sensing, digital imaging) where possible. More timely and accurate assessments will better inform fishery management, allowing for maximum fishing opportunities. The Budget also includes \$15 million, an \$8.9 million increase, for ocean acidification research to improve our understanding of the impacts to ocean and coastal marine resources, and to develop tools and adaptive strategies for affected industries and stakeholders.

The NWS provides weather, water, and climate forecasts and warnings for the protection of life and property and enhancement of the national economy, and it must evolve to meet growing and changing demands for its products and services. To that end, an increase is requested (+ \$3 million) to support response and implementation of recommendations from two independent studies of the NWS – *Weather Services for the Nation: Becoming Second to None* by the National Academy of Sciences in 2012, and *Forecast for the Future: Assuring the Capacity of the National Weather Service* by the National Academy of Public Administration in 2013. Both studies urge the NWS to become a better, more agile organization, and this increase will support analyses of workforce and infrastructure, enhance capacity for testing and demonstration, improve integration of stakeholder advice, and promote better evaluation of progress.

Imperative to supporting the evolution of the NWS is the transition of weather-related research projects to operational use. An increase of \$3 million is requested for the U.S. Weather Research Program for Enhancing Readiness Levels for Short- and Long-term Research, which supports improving NOAA's weather products and services. This increase aims to improve the readiness of those weather and related research projects associated with critical technologies, model improvements, and service applications to a stage of development that will enable a successful future transition to operations for deployment by NOAA's operational entities. The acceleration of weather research to operations will support improvements in the forecasting of events such as tornadoes and hurricanes, storm surge, inundation, volcanic ash, and ice cover for a Weather-Ready Nation.

Providing Services to Enhance Community Resilience

In 2013, the United States experienced seven weather- and climate-related disaster events with losses exceeding \$1 billion apiece.² Each of these events caused widespread damage and devastated families, businesses, and communities. The question of our time isn't "if" the next big event is going to hit, but "when" it will hit, and how hard a blow it will deliver to our society and our economy. Recognizing this, this budget invests in the services and information that promote community and economic resilience in advance and in the aftermath of these kinds of severe

² <http://www.ncdc.noaa.gov/billions/events.pdf>

events.

The FY 2015 budget makes critical investments in: expanding coastal inundation tools to enable better flood warnings, supporting other activities that improve communities' ability to respond to extreme events, improving ecological forecasting, and understanding the potential environmental impacts of growing commerce in the Arctic.

NOAA strives to ensure that the public is kept safe. To that end, I am proposing increases for building capacity for response and resilience. An increase of \$5 million is requested to provide products and services that help coastal communities prepare for, respond to, and recover more quickly from extreme events, such as floods, hurricanes, and other inundation events. As a means to help keep the public safe and maximize economic benefit of beaches, an increase is requested (+ \$4 million) to support ecological forecasting, which will allow NOAA to continue to develop and operationalize forecasts of harmful algal blooms, hypoxia, pathogens, and species distributions. This intelligence is critical to coastal communities and the businesses that depend on healthy oceans, working waterfronts, and tourism.

The Arctic is an emerging area of environmental and economic issues, many of which have significant impacts for human lives, livelihoods, and coastal communities. NOAA is proposing investments in the Arctic (+ \$2.2 million) to enable sustainable economic activity. Increases are requested to improve oil spill response capacity and to increase observations. The former will enable the improvement of models to predict oil movement and weathering in ice-covered waters, identification of sensitive ecological resources, better coordination with and preparedness of local communities, and increased research to fill science gaps. In order to increase observations, NOAA will implement a distributed biological observatory to improve our understanding of how climate and human-induced change are affecting subsistence cultures and the environment. These investments will, in turn, lead to improved management of Arctic coastal and ocean resources, including fishery resources with potentially high value.

Strengthening coastal communities and ecosystems, and providing tools to communities to be more resilient in the face of extreme events, is a key theme at NOAA, and I am requesting an increase of \$15 million for Regional Climate Data and Information. This request will support:

- The National Integrated Drought Information System (+ \$1,900,000) – the requested increase is in support of competitive research grants and contracts to develop the Regional Drought Early Warning System and research projects that address coping with drought across a range of sectors.
- Climate assessments (+ \$3,970,000) – to support assessments at the regional and national scale in compliance with the Global Change Research Act of 1990.
- Regional Integrated Sciences and Assessments (+ \$4,640,000) – the increase will support an expansion of the regional research and information services, such as external research and development of new information about the impacts of climate on communities, human health, infrastructure, resources, and transportation.
- Arctic Research Program (+ \$2,190,000) – for further development of NOAA's Arctic Observing Network and informational products related to Arctic Ocean changes.
- Climate Resilience Toolkit (+ \$2,300,000) – to continue supporting development of the Toolkit, the Climate.gov Portal, and to facilitate public online access to NOAA's climate

data, information, and services in support of the President's Climate Action Plan.

The requested increase for NOAA's regional climate information tools acknowledges and aims to improve upon these products and services.

Opportunity, Growth, and Security Initiative

This Initiative recognizes that, through the Bipartisan Budget Act of 2013 (BBA), Congress came together to replace the damaging cuts caused by sequestration with longer-term reforms. While the President's Budget adheres to the BBA's discretionary funding levels for 2015, these levels are not sufficient to expand opportunity to all Americans or to drive the growth our economy needs. For that reason, the Administration's FY 2015 Budget also includes a separate, fully paid for \$56 billion Opportunity, Growth, and Security Initiative.

NOAA infrastructure and research and development (R&D) initiatives make up \$180 million of this fund and are investments that will help spur economic progress, promote opportunity, and strengthen national security. Moreover, the Opportunity, Growth, and Security Initiative is fully paid for with a balanced package of spending cuts and tax loophole closers, showing that additional pro-growth investments are easily affordable without increasing the deficit. At NOAA, the Initiative will support progress in the areas of fortifying infrastructure and will improve its research and products related to preparing local communities and industries for climate-related impacts on their safety and economic well-being, specifically:

- Sustained observations and data gathering capabilities by constructing a NOAA ocean survey vessel;
- Improved understanding of drought impacts on industries, ecosystems, and human communities through the National Integrated Drought Information System (NIDIS) "Coping with Drought" initiative;
- Expanded products and services related to sea level rise and coastal inundation events;
- Studies on the impacts of changing ocean conditions on living marine resources; and
- Improved heat advisories and more confident projections for heat stress probabilities.

NOAA also proposes to further support the R&D that is the foundation of our activities related to understanding and preparing for sea level rise, mitigating drought impacts, understanding climate impacts on living marine resources, and preparing local communities for extreme events.

Climate Resilience Fund

Individuals, businesses, and communities are turning to NOAA as a trusted source for science and information to help them understand how and why climate conditions are changing and how they can prepare for those changes. NOAA's regional climate information tools are supported by our strong foundation in science, including global climate observation and monitoring networks, world-renowned scientists, and state-of-the-art climate models. The President's Budget also includes, as part of the Opportunity, Growth, and Security Initiative, a \$1 billion Climate Resilience Fund. Of that \$1 billion, there is \$75 million for NOAA broken up into two specific activities:

- Climate Resilience Research – \$25 million – these are research grants to further the understanding of climate change impacts on various sectors (e.g., fisheries) and improve severe weather prediction models.

- Climate Resilience Grants to Communities – \$50 million – these are competitive grants to state, local, and tribal governments and nonprofit organizations for projects that improve coastal resilience to severe weather events, climate hazards, and changing ocean conditions.

CONCLUSION

Overall, NOAA's FY 2015 Budget request reflects the commitment Secretary of Commerce Pritzker and I have made to the President to growing a strong economy that is built to last, while being fiscally responsible and focusing on priority initiatives. NOAA is a vital component of the U.S. Government, helping to maximize U.S. competitiveness, enable economic growth, foster science and technological leadership, and promote environmental stewardship. Americans – civilians, the military, and businesses – rely upon the services NOAA provides on a daily basis.

Demand for NOAA's environmental intelligence and services is rising at the same time that the mix of services needed is evolving and budget pressures are increasing. These competing tensions place a premium on achieving organizational excellence: attracting and retaining the best talent; managing the basics of execution; operating with both high efficiency and optimal effectiveness. The FY 2015 budget proposes targeted investments that are needed to drive improved results in sustaining and developing our workforce's skills and provides much-needed capacity in our grants, finance, and workforce management departments.

NOAA is fortunate to have a highly skilled and passionate workforce. Our people come to work each day committed to serving the public and advancing our mission. Our work touches every community across the United States, and we aim to perform at the highest level and with discipline and consistency. Every one of our investments in the FY 2015 budget – from improving products and services to positioning ourselves for the future – will help the organization as a whole strive for excellence and deliver the environmental intelligence our country has come to rely upon.

I look forward to working with the members of this Committee and our partners and constituents to achieve the goals I articulated through the implementation of the FY 2015 budget. Thank you for the opportunity to present NOAA's FY 2015 Budget request. I am happy to respond to any questions from the Committee.

NOAA Leadership

Dr. Kathryn D. Sullivan



Dr. Kathryn D. Sullivan, NOAA Administrator and Under Secretary of Commerce for Oceans and Atmosphere.

Dr. Kathryn Sullivan was confirmed by the Senate as the Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator on March 6, 2014, having served as Acting NOAA Administrator since February 28, 2013. She is a distinguished scientist, renowned astronaut and intrepid explorer.

Prior to her appointment as Acting Administrator, Dr. Sullivan held the position of Assistant Secretary of Commerce for Environmental Observation and Prediction and Deputy Administrator, and also performed the duties of NOAA's Chief Scientist, a vacant position. As Assistant Secretary, Dr. Sullivan played a central role in directing Administration and NOAA priority work in the areas of weather and water services, climate science and services, integrated mapping services and Earth-observing capabilities. She also provided agency-wide direction with regard to satellites, space weather, water, and ocean observations and forecasts to best serve American communities and businesses. As Deputy Administrator, she oversaw the smooth operation of the agency.

Dr. Sullivan is the United States Co-chair of the Group on Earth Observations (GEO), an intergovernmental body that is building a Global Earth Observation System of Systems (GEOSS) to provide environmental intelligence relevant to societal needs.

Dr. Sullivan's impressive expertise spans the frontiers of space and sea. An accomplished oceanographer, she was appointed NOAA's Chief Scientist in 1993, where she oversaw a research and technology portfolio that included fisheries biology, climate change, satellite instrumentation and marine biodiversity. She was the inaugural Director of the Battelle Center for Mathematics and Science Education Policy in the John Glenn School of Public Affairs at Ohio State University. Prior to joining Ohio State, she served a decade as President and CEO of the Center of Science and Industry (COSI) in Columbus, Ohio, one of the nation's leading science museums. Dr. Sullivan joined COSI after three years of service as Chief Scientist.

Dr. Sullivan was one of the first six women selected to join the NASA astronaut corps in 1978 and holds the distinction of being the first American woman to walk in space. She flew on three shuttle missions during her 15-year tenure, including the mission that deployed the Hubble Space Telescope. Dr. Sullivan has also served on the National Science Board (2004-2010) and as an oceanographer in the U.S. Navy Reserve (1988-2006). She holds a bachelor's degree in earth sciences from the University of California at Santa Cruz and a doctorate in geology from Dalhousie University in Canada.

Mr. SCHWEIKERT. I want to thank our witness. And reminding all members that our rules limit us to 5 minutes, I am going to give myself five minutes here.

And a couple of the questions I touched with you in regards to the opening statement, let's sort of walk through them. Explain to me and help me understand what has been referred to as sort of the satellite coverage gap and what is being done to mitigate that and what optionality do you have.

Dr. SULLIVAN. The prospect of the gap, Mr. Chairman, arises from the recasting of satellite programs back in 2009 and regaining a smooth production cadence, budget control, schedule control, and cost control. We have those now well in hand on the polar program.

When you look at the projected lifetimes of the current assets in orbit and the time to deliver the new ones, the statistical analyses with different assumptions say, gee, you might not get there in time. So we are laser-focused on four key things. We are managing the current on-orbit assets to maximize the livelihood. We are going to stick the JPSS-1 launch date, and the past 18 to 20 months of schedule and budget performance I believe indicate we are on the right track to do that.

Chairman SCHWEIKERT. Now, Doctor, within that point what do you think the gap will be?

Dr. SULLIVAN. Well, we can spend probably this whole hearing block and many others, Mr. Schweikert, debating statistical assumptions that would give you different analysis of that.

Chairman SCHWEIKERT. Just your best guess.

Dr. SULLIVAN. I am not even focusing on what the best guess is because it is all so fluid. Statistical analyses can be slanted or come up with all sorts of answers. I am focusing on manage the asset we have to protract its life and stick the launch date.

In addition, we are focused on the mitigation plans that we have discussed with this committee and other Members of the Congress in the past year, and that is to understand what if any additional data sources could be brought online as a hedge against a gap, what improvements to our forecast enterprise could we make to lessen the impact of a gap, should we have one, and a whole plethora of other activities that we have detailed in a prior testimony.

Chairman SCHWEIKERT. That pleases me to hear that within your optionality, we will use that word again, you will also look at what other sources might be out there, what other data could be purchased or even short-term satellite coverage.

Dr. SULLIVAN. We are looking at that. Our criteria of course would be viable, proven capability to deliver in the time frame required.

Chairman SCHWEIKERT. Okay. Doctor, just because it is an area of interest and being down to two minutes and 40 seconds, I wanted to talk about what you believe the future of data gathering is, particularly as you and I have already started to discuss sort of the crowdsourcing of data and all the instruments that we all now carry in our lives, whether it be our cars, our handheld computers, those who have home weather stations. What does that mean to you and what does it bring to you?

Dr. SULLIVAN. That is a trend that is overtaking all of us and we are watching very carefully. My own view is it is going to play

out on a number of different fronts. If you look at during severe weather events, NOAA and other partners already do crowdsource data. We get rain reports, snow reports, tornado reports from people on the ground, through social media. The delivery of a measurement directly from a cell phone into the production weather model I think will take a longer time to attain. There is work yet to be done to really be sure we understand how to handle the various reliabilities, the various precisions that that menagerie of instrumentation might have. I think the progress in solution we may eventually make to that will come through a combination of both government, academic, and private sector efforts. And it is afoot right now. We are watching it all around us and it is already affecting real-time weather forecasting both for NOAA forecasters and for our value-added partners in the broadcast and weather enterprise—commercial weather enterprise.

Chairman SCHWEIKERT. Okay. Can you share with us and the committee difficulties that are out there because of the IBM sale and your access to large data crunching and management?

Dr. SULLIVAN. The potential sale by IBM of their Lenovo unit is something that the Treasury Department is tracking closely and I have to defer all questions about that particular sale to them.

In terms of large data handling, we had challenges on a couple of fronts. Our operational supercomputing that produces the production runs every three hours is one that we are on good track to come up to par with the Europeans on. We have—our performance has lagged behind them on certain weather events, certainly not on all weather events over the past few years predominately because our operational supercomputer lags behind theirs. So that one is catching up.

When it comes to—I am sorry. I just lost my train of thought.

Chairman SCHWEIKERT. No, it is okay. I know some of this you do not control and actually in many ways with my fixation on crowdsourcing of access you may actually need substantially more capability in your computer side.

I am holding an article that was written by a researcher I believe in New York and I haven't had—I am sorry, University of Washington. Forgive me. And it was only given to me as I was literally walking in the meeting, but the author of this is actually sort of claiming that we have moved sort of down to fourth place in weather forecasting accuracy, data collection. Any thoughts, any comments? Is it even something you have seen?

Dr. SULLIVAN. I haven't seen it so I wouldn't wish to comment on it.

Chairman SCHWEIKERT. Okay. My very last question, I know I am slightly over time. As an agency, you produce lots of rigorous scientific data, proposals, mechanics. How do you do sort of your peer-review on your methodology? Do you continue with what you are doing sort of a very open access to information? I am just sort of curious if that is something that has hit your desk.

Dr. SULLIVAN. It hits my desk and is on my radar screen very much because it goes to the heart of our commitment to scientific integrity and proper methods for assuring that. In the weather and the climate domain, which, by the way, are just different timescales of the phenomena of this planet, we are tightly interlaced with the

best researchers globally, not just in the United States. The development of models nowadays is quite commonly—to use a loose term—a community playpen where various models are rigorously tested and compared by everybody looking——

Chairman SCHWEIKERT. I am not even sure you would say loosely. My impression is it is all over the world now.

Dr. SULLIVAN. Oh, it definitely is all over the world and it is a very robust, vibrant, challenging cross comparison of models, of methods, of techniques.

Chairman SCHWEIKERT. Do you believe NOAA continues to sort of adhere to that openness where it is a community of thought that is vetted back-and-forth but accepts lots of inputs in, you know, accepts and rejects, but is open to the debate?

Dr. SULLIVAN. I believe we are very open to the debate around quality rigorous scientific data and findings and judgments, absolutely.

Chairman SCHWEIKERT. And forgive me for asking the question a bit ethereally.

All right. And with that, Ms. Bonamici.

Ms. BONAMICI. Thank you, Mr. Chairman. Thank you, Dr. Sullivan, for being here.

I want to talk about disaster preparedness and the importance of that and focus on the coastal environment where there is such enormous and potentially grave consequences, so I wanted to talk about two specific topics that you raised in your testimony, ocean acidification. The ocean is becoming more acidic as it absorbs excess carbon dioxide from the air, and this change has the potential to, among other things, disrupt aquatic food webs.

And in Oregon the shellfish industry has already seen the harmful effects and I want to point out that even for Representatives who don't represent coastal communities, their constituents eat shellfish and restaurants need it and it is an important industry. The fishermen really dread what they might learn about damage to the food chain from ocean acidification. The budget request proposes an increase of \$8.9 million for the ocean acidification program, so can you please discuss the need for that program and especially how NOAA is translating its research into practices and strategies that benefit the industry?

Dr. SULLIVAN. Thank you for that question. This is really one of the silent creeping hazards of our changing planet. NOAA seeks to better understand the processes and causes behind ocean acidification and in particular, as you point out, to develop methods that can translate our understanding and our monitoring of the natural environment into this thing I keep calling environmental intelligence, actionable and action-oriented timely information that, as you know from your State, enables your constituents to manage the water intakes to their shellfish farm and protect their brood stock. So that is very much one of our key focal points in coastal resiliency generally.

The Northwest Coast acidification is one of the principal risks. The Great Lakes and the Gulf of Mexico, harmful algal blooms are also of concern. So how do we help coastal communities? How do we help provide them the information that beach managers, fishing

managers, shellfish processors can actually apply to keep their communities, their businesses, their families safe?

Ms. BONAMICI. Thank you. And also I wanted to talk about the Tsunami Warning and Education Act, which we will likely be considering and I am glad we are going to take that up.

For constituents up and down the coasts who grew up memorizing tsunami evacuation routes, this can't come soon enough. In that regard, I was concerned to see that the President's budget includes a reduction to education and awareness program grants under the National Tsunami Hazard Mitigation Program. How does NOAA intend to ensure our regional decision-makers are able to develop and execute effective tsunami response plans without that grant program in place?

Dr. SULLIVAN. Well, first of all, let me thank you for your support for the reauthorization of the Tsunami Warning and Education Act. That is a valuable piece of legislation that we do appreciate.

With respect to the Fiscal Year 2015 budget, I also want to assure you that this in no way affects our principal responsibility, which is to provide those warnings and alerts that enable communities to take prompt action and get out of harm's way in the case of the tsunami. It does not affect the operability and the maintenance of the DART buoys, the key monitoring systems on the seafloor that feed that, does not affect our monitoring and collaboration with the U.S. Geological Survey that can access their seismic monitoring. It does not affect the ongoing relationships and education and connections between our National Weather Service folks and communities along the coast.

Regrettably, in the tight fiscal climate we are in where we cannot—we don't have the means to advance all of the things we would wish to advance, we had slowed—we proposed in this budget to slow down to curtail the added grants that could expand the education footprint, but we are not curtailing the tsunami-ready community program that exists with existing communities. So our core responsibilities aren't changed. The rate—some rate of progress has slowed down.

Ms. BONAMICI. Thank you. And I look forward to having the conversation where we take up that legislation.

And on a related note, I often discuss the importance of NOAA's research and outreach activities in the community, and our constituents understand that NOAA is doing its best with limited resources. But as you explained, there is unmet need. But as you also acknowledge, there are fiscal challenges. So I was pleased to see the budget request that proposed a three percent increase, but I was also dismayed that the House Appropriations Committee is proposing a one percent cut to the budget. So considering the unmet need for your agency's work, can you give the Committee a brief idea of what a one percent funding cut compared to a three percent increase might mean for the work that you do for our constituents?

Dr. SULLIVAN. It would take me more time that we have left to enumerate all the different service needs, drought information, water planning information, El Nino—refining the El Nino forecasts so we can do a better job helping California and the Western States know in advance if the drought will break, when the pattern

might shift, bringing our high-performance computing up to par and keeping on the pace that we are currently on, which will put us back on par with the Europeans and anybody else and remove the bulk of whatever I suspect underlies the ranking you have in that article. Weather, climate, understanding the ocean, keeping pace and understanding fish stocks so that our coastal fishing communities have vital economies all across the front, there already are unmet needs.

Ms. BONAMICI. Thank you. And I am going to just ask will you please focus on the importance of climate research to the work that you do?

Dr. SULLIVAN. I would be delighted to focus on that. NOAA exists to understand this planet and how it works and turn that information into useful actionable information. That really requires us to understand across all of the timescales that the planet actually has. So in NOAA, weather is phenomena and the ocean in the atmosphere up to about two weeks in length and climate is assembling those same phenomena over longer timescales. So our ability, for example, to help those water managers that I was referring to in California or ranchers in the Southwest, help them know what is their outlook for the next season for drought, that comes from understanding how the tropical Pacific climate system works on seasonal scales, that thing called El Niño or scientifically the El Niño southern oscillation, being able to give these six-day outlooks that we gave to the South Central States in this most recent set of severe storms, it doesn't come from focusing harder on weather; it comes from having focused more richly on oceans and coupling that understanding with our understanding of the atmosphere.

The range of information needs that American citizens and business have—businesses have is across a huge range of timescales. And if we aspire, as NOAA is chartered to do, to respond to those demands, to those really urgent needs across the whole range of scales, we have to be able to investigate and study and understand the many different timescales that are natural to this planet. To use a metaphor, we have to be able to play the whole keyboard if we are going to play the symphony that our communities are really asking us to play.

Ms. BONAMICI. Thank you, Dr. Sullivan.

And thank you, Mr. Chairman, for allowing me to—

Chairman SCHWEIKERT. Thank you, Ranking Member.

Ms. BONAMICI. Thank you.

Chairman SCHWEIKERT. And, Vice Chairman, Mr. Bridenstine.

Mr. BRIDENSTINE. Thank you, Mr. Chairman.

Thank you for being here, Dr. Sullivan. It is always a privilege to get a chance to talk to you. I wanted to delve into the Ocean and Atmospheric Research office, OAR, of course the research arm of NOAA. And it looks like the budget request suggests a request for an additional \$31 million over last year, is that correct?

Dr. SULLIVAN. I believe that is a correct figure.

Mr. BRIDENSTINE. And about \$31 million, the request—the President's budget request has a climate research subprogram increase of about \$30.5 million. So the majority of OAR's budget request, the majority of the increase, in fact the vast majority, \$30.5 million out of \$31 million, is for climate research, is that correct?

Dr. SULLIVAN. Yes, specifically for improving the drought information products that we are providing to Western States. I think about 11 of the States represented on this committee in fact are in something between severe and extreme drought right now. So again that label "climate" in the NOAA budget means a certain thing. It means the information products that are pertinent to those longer timescales.

Mr. BRIDENSTINE. The National Weather Service in this budget request under OAR is being cut by about \$4 million, is that correct?

Dr. SULLIVAN. I don't have that detailed figure just in front of me.

Mr. BRIDENSTINE. Well, I have it here and it is about \$4 million.

Dr. SULLIVAN. Okay.

Mr. BRIDENSTINE. The challenge is, and you are probably aware we have had a number of deaths in Oklahoma and Arkansas over the last few days, and as you can imagine, when the priority of NOAA is to save lives and property, which is what you have told us the priority is, and yet the research elements are going to climate research as opposed to what we know we can do, which is save lives and property today, we are doing this in the State of Oklahoma, which is the State I represent.

At the University of Oklahoma, the National Severe Storms Laboratory, we are able to prove that we can predict tornadoes over an hour in advance now and not just predict but we can warn people based on the forecast of a tornado over an hour in advance, and yet still this week people have died with less than a minute of lead time of warning and all the research increases going toward climate change research and not toward weather forecasting and warning, which is where we know we can save lives and property. Would you address for the Committee your commitment to saving lives and property and explain how this budget request might do that?

Dr. SULLIVAN. Commitment to protecting lives and property runs across the entire scale of phenomena that pose hazards to the lives and property of Americans from the chronic conditions of the drought that are devastating families and businesses across California and the Southwest right now to the acute—

Mr. BRIDENSTINE. Real quick, I am going to interrupt here for a second, we have people that died this week that should have had more lead time than 1 minute. Do you agree with that?

Dr. SULLIVAN. The statistics I have, sir, say that they had 20 to 29 minutes.

Mr. BRIDENSTINE. There are people that did. There are people that got less. And if we were able to move the technologies in the direction where we could get over an hour of lead time, guess what, the people would have more heads up before the tornado hit their vehicle driving on the highway.

Dr. SULLIVAN. Mr. Bridenstine, I completely share your desire to have greater lead time for people in Tornado Alley. There are a number of things that we can and should do to achieve that. One of them I would highlight for this committee and that we have requested support for in this budget as well is to help us put the Weather Service on a path where it can in fact—it has the flexi-

bility to evolve and change and move forward more rapidly with technology changes and research advances. So helping us evolve the National Weather Service should be right up on top of that list if we want to really improve the services that we are giving to our people, and we certainly do.

Mr. BRIDENSTINE. Roger that. I yield back.

Chairman SCHWEIKERT. Thank you, Mr. Bridenstine.

Ms. Edwards, 5 minutes.

Ms. EDWARDS. Thank you very much, Mr. Chairman, and thank you, Dr. Sullivan, for being here, and thanks again for reminding us of the important work that the researchers, scientists, engineers, all of the staff at NOAA, all the work that they do that keeps us all safe. Obviously all of us would like to be safer and there has been no more stark reminder of the need for NOAA than the experiences of the last week-and-a-half to two weeks. And since everybody else did it, congratulations again on the Time magazine designation. I want to make sure that is across the board here.

I want to ask you about COSMIC-2. The budget request includes an increase of \$4.8 million for ground reception and processing of COSMIC-2 satellite data provided by Taiwan and the United States Air Force. My understanding is that these data are not available from any other source. Can you just describe the value of the data and the impact that would happen for losing this capability?

Dr. SULLIVAN. Thank you, Mrs. Edwards. We are very much committed to the COSMIC-2 project. Studies by the European Centre for Medium-Range Weather Forecasts that have looked at the relative contribution to forecast accuracy and reliability of different kinds of data have demonstrated the value of COSMIC-2 data.

This is, as you know, radio occultation data collected using GPS satellite signals. This is very high-quality data. Its reliability is very high. It is valuable in its own right, but interestingly, it actually also improves the value of the more precise-sounding data from our workhorse instruments on the polar satellites. NOAA, as you point out, proposes and requests funding in this budget to install the ground system that would let us process COSMIC-2 data, now will be designed in a way that should there eventually ever be a decision made and a viable provider to acquire radio occultation data in a different manner could take those data as well.

So I would say two things. We are very supportive of COSMIC-2. It is a tremendously cost-efficient way to go forward. It is right now the only proven viable capability in hand to attain radio occultation data in the 2016 time frame. And to the Chairman's—whip it back to the Chairman's earlier question about actions that might help us if we did have a gap in the polar satellites, having COSMIC-2 on orbit providing those data was highlighted in our independent report as one of the most effective things we could do to lessen the damage, lessen the degradation in forecasts—

Ms. EDWARDS. Right.

Dr. SULLIVAN. —that such a gap would create.

Ms. EDWARDS. Excellent. Thank you very much. And then I want to go to the workforce a minute. NOAA is proposing a reduction of \$10 million in the elimination of the nine full-time employees with-

in the National Weather Service as part of a consolidation effort of technology support and services in six facilities.

And, you know, there was a recommendation in the 2014 budget that was essentially rejected by—the Senate was very specific in the report language that the Committee did not possess the evidence that the National Weather Service has its workforce plan completely under control at this time, certainly not enough to propose further reductions without NOAA addressing why some positions remain unfilled or articulating what the proper staffing level is for field offices. I tend to agree with that sentiment expressed by Senate appropriators, especially in light of the proposed \$3 million increase to support analysis of NWS workforce and infrastructure.

Also, I noticed that there is an increase of \$12 million for corporate services. I don't even know what that is so I want you to—if you would, to explain that, but then particularly explain how you are going to complete a timeline for filling the vacant weather forecasting positions and why do we need to eliminate 98 FTEs in the National Weather Service.

Dr. SULLIVAN. I am not sure I can do that in 48 seconds.

Ms. EDWARDS. Well, try.

Chairman SCHWEIKERT. We will give you 50.

Ms. EDWARDS. There you go.

Dr. SULLIVAN. No, you are a gentleman and a scholar, sir.

First, with respect to the information technology officers in the capital is that, that proposal is not about the people. The IPOs are valuable employees. It is about improving the National Weather Service service delivery model and ensuring that we are making best use of government resources. I have led technology-based businesses before. So has my boss, Secretary Pritzker. We both know that you are dead in the water if you stop innovating and evolving and keeping pace with the world.

The fact is that our IT delivery model was developed in the age before the internet and has been stagnant since then. Regional IT service delivery is just plain out proven industry and government best practice. Our current model is unsophisticated, outdated, and is not keeping up with the pace of technology change. National Academy of Public Administration told us plain and simple that we need to provide more robust, consistent nationwide services with regional teams, and regional teams are a more appropriate way to do that. So that is on the ITO.

We have backlogs of vacancies in many parts of NOAA due largely to the unfortunate consequences of sequestration in the extreme responses, the extreme consequences and actions that that forced all agencies to take, NOAA included. One of them that we were forced to obtain was an agency-wide hiring freeze, which throttled us back to only the most critical hiring positions for the better part of a year. I was delighted to be able to lift that freeze at the end of January this year, but we still have to work our way out of that backlog.

And that brings me slightly over the Chairman's time to your third point, why an increase in corporate services? That is the budget label for what I would call NOAA's back house functions, administrative services, grants, contracts, acquisition, and our

human resources processing. So I am 1/3 the capacity of many sister agencies. I am 40 percent below the capacity of the average United States company on the fundamental capacity to make the cranks turn and perform the core functions of this organization. That is why I need to fortify my corporate services functions. That is what it will take to ensure that we can work through hiring actions like the ones we need to work through for the Weather Service and the fishery service and the ocean service.

So it all does link together. It all is about letting this organization move forward, achieve organizational excellence, and be flexible and adaptable to keep pace with the times and the urgently growing and changing needs of our public.

Ms. EDWARDS. Thank you, Mr. Chairman, for your indulgence.

Chairman SCHWEIKERT. Thank you, Ms. Edwards.

Mr. Rohrabacher.

Mr. ROHRABACHER. Thank you very much.

You know, we have found that contracting out can actually save money for the government and thus we have more funds to accomplish the missions of government if we let the private sector get involved. And, for example, I mean SpaceX has saved us already hundreds of millions of dollars by utilizing that approach rather than just having the government have launches.

NOAA is not exempt from this rule. I mean that perhaps NOAA could be saving some money by purchasing, for example, satellite data to be used by NOAA and government users. And has NOAA done some evaluation of that? And where do you stand in terms of achieving the actual acquisition of private satellite data that would help us determine and reach your goals?

Dr. SULLIVAN. It is a very important question, Mr. Rohrabacher, and as I am sure you know, we do purchase data from commercial vendors in a number of arenas, including the weather arena right now. We are not opposed categorically to commercial data from satellites, but I would make a few points. One is because of the criticality, the daily everyday criticality of the weather enterprise to the safety of this Nation, we believe we need to adopt the mountain climbers' rule with respect to making switches, and that is let go of the current handhold only when you really have a firm grasp on the next handhold. As you know, that is also—that mimics the astronauts' rule of never let go of one tether until you have got that other one attached.

Mr. ROHRABACHER. Right.

Dr. SULLIVAN. Right now, there are no proven viable commercial entities. And I talk about I mean people who can show proof positive, not a really spiffy PowerPoint presentation about their ability to deliver—

Mr. ROHRABACHER. Have we provided any incentives for the private sector to invest in this area?

Dr. SULLIVAN. I am not aware of any commercial incentives that we have provided but we don't have the kind of budget structures or accounts that would really let us do that. We have clear policies, clear ground rules. The National Weather Service has 16 long-standing criteria for data quality. We buy instrumentation and data from vendors that can demonstrate that they can meet those constraints.

I would add one other point, though. I think there is another dimension that is very important for us to keep in mind in this specific case. Your general point about public-private interaction I take, but in this specific case, the United States commercial weather enterprise is founded on the premise that the foundational data that produce—that are the feedstock for NOAA's forecasts are public good. The downstream economic benefits garnered off of those data are very, very real and quite considerable. There are over 300 private weather companies today that use those data as feedstock. There is no other weather enterprise on the planet that takes that model of a private innovation platform in the data as a public good——

Mr. ROHRABACHER. Yeah.

Dr. SULLIVAN. —and produces the private sector value-added economic activity on the downstream.

Mr. ROHRABACHER. Um-hum.

Dr. SULLIVAN. I would urge before we rush to commercial data sources just in particular to ease short-term funding pressures that we—and I mean NOAA and this committee, other relevant bodies of the Congress and stakeholders—that we evaluate carefully and really think through the impacts, the intended and the unintended impacts——

Mr. ROHRABACHER. Um-hum.

Dr. SULLIVAN. —that might come from monetizing the data stream, which I think might well constrict that rich innovation we have in 300 private sector companies currently rather than continuing to treat it as a public good.

Mr. ROHRABACHER. That is an interesting admonition and I think that we should be working on that concept to see if we can come up with a formula that meets the criteria that you just mentioned.

Another area, then this goes back to some of the fundamental differences that we have here on fundamental issues, and Vice President Al Gore, former Vice President Al Gore, recently said in an interview that extreme weather events are 100 times more common today than they were 30 years ago due to global warming and also stated that these events are getting more frequent. Are extreme weather events 100 times more common today than 30 years ago due to global warming and are they getting to be more frequent? It seems that we have had other people testifying and other experts suggesting that that is not true.

Dr. SULLIVAN. I don't—Mr. Rohrabacher, I am not conversant enough with those statistics off the top of my head to want to attempt to give you detailed answers. I will certainly get back to you on that. I do know that our best scientists within NOAA are very cautious and leery about attributing specific extreme weather events to climate change per se. There is——

Mr. ROHRABACHER. Right.

Dr. SULLIVAN. —I have been referring to so many patterns and so many timescales interacting to produce the phenomena that we experience on Earth. The challenge of attribution is a very difficult one.

Mr. ROHRABACHER. Right. You know, I sat through Hurricane Hazel back in 1956, and I lived in North Carolina; my father was a Marine. We lived at Camp Lejeune.

Dr. SULLIVAN. Um-hum.

Mr. ROHRABACHER. And I remember that event very vividly and I was surprised to find out that—am I correct that Hurricane Hazel was actually more powerful than Hurricane Sandy, although the actual damage that was caused was less because Sandy happened to have come with a number of factors rather than just the one weather factor?

Dr. SULLIVAN. Well, I will get back to you on the actual recorded hurricane intensity of Hazel because you don't want me saying how old I was at that time. But, you know, the damages caused are certainly changing as a population density and the built infrastructure in coastal zones changes over time.

Mr. ROHRABACHER. Right.

Dr. SULLIVAN. So——

Mr. ROHRABACHER. Well, thank you very much, and thank you, Mr. Chairman.

Chairman SCHWEIKERT. Thank you, Dana—or, Mr. Rohrabacher.

And we would never ask that but we are going to tease Dana about 1956, so just plan on that.

And I want to thank Dr. Sullivan for her valuable testimony and the members for their questions and comments. The members of the committee may have additional questions for you and we will provide those to you in writing. The record will remain open for two weeks for those additional comments and questions from the members.

And with that, the witness is excused and the hearing is closed.

Dr. SULLIVAN. Thank you again, Mr. Chairman.

[Whereupon, at 11:05 a.m., the Subcommittee was adjourned.]

Appendix I

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by Dr. Kathryn Sullivan

**U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE, SPACE,
AND TECHNOLOGY
Subcommittee on Environment**

**Hearing Questions for the Record
The Honorable David Schweikert**

*An Overview of the National Oceanic and Atmospheric Administration Budget
Request for Fiscal Year 2015*

The Honorable Kathryn Sullivan

- 1. A NOAA Independent Review Team recommended a "gap filler" mission as a way to help mitigate potential gaps in the afternoon polar orbit and make NOAA's polar satellite program more robust. What is NOAA doing to address this recommendation and how are those plans reflected in the FY 2015 budget request?**

- a. Are there any other options NOAA is examining that could enhance the robustness and resiliency of its polar satellite program?

Response: The Administration remains focused on increasing the robustness of our polar-orbiting weather satellite program and mitigating the potential impacts to NOAA's National Weather Service (NWS) forecasts, services and products in the event a gap materializes. The FY 2015 President's Budget allows NOAA to do three things to increase the robustness of the polar program. First, the budget provides sufficient funds to ensure the primary satellite providing operational weather data in the afternoon polar orbit, Suomi National Polar-orbiting Partnership (Suomi NPP), is operated and managed to maximize the length of its mission life. Second, the budget keeps the JPSS -1 spacecraft on track to launch no later than the second quarter of FY 2017. Finally, the budget allows the JPSS program to purchase additional, critical long lead sub-assemblies and parts to protect the JPSS-2 schedules. Any sub-assemblies and parts not required for JPSS-2 would then be available to support the build of ATMS (Advanced Technology Microwave Sounder) and CrIS (Cross-track Infrared Sounder) instruments for follow-on missions. Together, CrIS and ATMS primarily provide data on the hydrologic cycle, which includes water vapor, clouds and precipitation. ATMS is able to provide a view inside and below clouds and can be used to produce images inside storms, including hurricanes. Because clouds are opaque in the infrared part of the spectrum (measured by the CrIS) and largely transparent at microwave frequencies (measured by ATMS), operating them together makes it possible to cover a broader range of weather conditions. This will provide invaluable data for understanding storms and making predictions up to five to seven days in advance of a severe weather event. These two instruments – ATMS and CrIS – are the most critical to the NWS.

The Department recognizes the need to build robustness into the JPSS program to maintain observations in the event of a loss of satellite observations in the afternoon polar orbit. The formulation and acceleration of follow-on missions is a critical component of NOAA's strategy to reduce the likelihood of a gap in satellite data through a more robust JPSS architecture. NOAA is looking at recommendations made by the NESDIS Enterprise Independent Review Team (IRT) for a robust polar follow-on program that includes accelerating missions to close a gap, or a Gap Filler mission. The first step in any decision is the procurement of long lead parts for ATMS and CrIS as quickly as possible.

2. **Has all the weather research funding provided by Congress this year for modeling improvements been used for weather models?**

a. **Has any weather research funding been used on climate model development?**

Response: Funding provided for OAR's Weather and Air Chemistry Research has not been used on climate model development. OAR invests this funding in research associated with the understanding and prediction of weather phenomena as well as evaluating the potential for these research results to improve NWS operations through transition activities.

b. **Can you assure me that no weather research appropriations have been used for model prediction efforts that go beyond the weather hazards time scale of forecasts out to two weeks?**

Response: No. Because of society's need to know well before high impact weather (e.g., hurricanes, tornado outbreaks, and flooding caused by heavy precipitation) strikes, a small portion of NOAA's weather research has been looking at how to improve the predictability of weather models from 2 to 4 weeks. Recent research in academia¹² and internationally based efforts¹⁴ indicates that such early warning systems are indeed possible and would provide the public with significantly more time to protect people, businesses, and property.

c. **Can you please provide documentation for the record delineating all weather research spending on specific models?**

Response: Several of OAR's research laboratories conduct research and development of weather models. These include the Earth System Research Laboratory's Global Systems Division (ESRL/GSD), the National Severe Storms Laboratory (NSSL) and the Atlantic Oceanographic and Meteorological Laboratory (AOML) and the Geophysical Fluid Dynamics Laboratory (GFDL). OAR's work to develop and improve weather models is composed of many aspects and relies on data, observations, and experiments from multiple sources for a single model. It is therefore difficult to delineate exact funding on any one model.

The FY 2014 OAR Spend Plan of OAR's main laboratories and divisions that work on weather modeling are as follows:

ESRL/GSD: \$10.6 million

NSSL: \$23.7 million

AOML: \$15.8 million

GFDL: \$21.1 million

NWS funds developmental work to transition relevant research advances into its operational forecast models.

The FY 2014 NWS Spend Plan supports work to transition hurricane model advances from the Hurricane Forecast Improvement Program (HFIP) and for development and testing of components for the Next Generation

¹ Ben P. Kirtman, Dughong Min, Johnna M. Infanti, James L. Kinter, III, Daniel A. Paolino, Qin Zhang, Huug van den Dool, Suranjana Saha, Malaquias Pena Mendez, Emily Becker, Peitao Peng, Patrick Tripp, Jin Huang, David G. DeWitt, Michael K. Tippett, Anthony G. Barnston, Shuhua Li, Anthony Rosati, Siegfried D. Schubert, Michele Rienecker, Max Suarez, Zhao E. Li, Jelena Marshak, Young-Kwon Lim, Joseph Tribbia, Kathleen Pegion, William J. Merryfield, Bertrand Denis, Eric F. Wood. (2014) The North American Multimodel Ensemble: Phase-1 Seasonal-to-Interannual Prediction; Phase-2 toward Developing Intraseasonal Prediction, 2014: B.A.M.S. 95:4, 585-601. Online publication date: 1-Apr-2014.

² Pegion, K., and P. D. Sardeshmukh, 2011: Prospects for Improving Subseasonal Predictions. *Mon. Wea. Rev.*, **139**, 3648–3666, doi:10.1175/MWR-D-11-00004.1

³ Vitari, F., 2014: Evolution of ECMWF sub-seasonal forecast skill scores, *Q. J. R. Met. Soc.* DOI:10.1002/qj.2256

⁴ Hoskins, B.J., 2012: The potential for skill across the range of the seamless weather-climate prediction problem: a stimulus for our science. *Q. J. R. Met. Soc.*, DOI: 10.1002/qj.1991

Global Prediction system from the Research to Operations initiative (R2O) to be transitioned into operations.

Total NWS research and development amounts for these programs are:

HFIP: \$1.7 million

HFIP High-Performance Computing: \$4 million

R2O initiative: \$13 million

3. Your FY2015 budget request includes \$3 million to begin implementing recent recommendations from the National Academy of Sciences and the National Academy of Public Administration.

a. Does this include putting together a federal advisory committee on weather issues, as recommended by NAPA?

Response: The FY 2015 budget request to begin implementing recent recommendations from the National Academy of Sciences (NAS) and the National Academy of Public Administration (NAPA) will be used to address those recommendations, including conducting the internal studies on staffing and facilities, as well as establishing a process to govern significant NWS change – which NAPA highlighted as the most important recommendation in their briefing to NOAA leadership. A key element in the process to govern significant change is the approach to engagement strategies, including the potential use of advisory bodies chartered and populated to address specific significant NWS changes when needed.

The Department believes the optimal approach to requesting consensus external advice, beyond utilizing already established avenues, will be to charter committees specific to the change(s) proposed, rather than establish a large-scale committee that is comprehensive enough to represent the views of all NWS stakeholders for any hypothetical change in NWS operations or services proposed in the following years.

b. What kind of an "analyses of workforce and infrastructure" will this include? If appropriated these funds, will the National Weather Service look at options to modernize, restructure, and potentially downsize Weather Forecast Offices in the U.S.?

Response: NWS will conduct analyses of workforce and infrastructure that will address the recommendations NAPA outlined, as well as provide a plan for implementing the findings. In FY 2015, NWS will focus on baseline analyses of current workforce skills, critical training requirements, and deficiencies in facilities and other infrastructure. Outyear focus will shift to describing workforce skills needed to support the Weather Ready Nation (WRN) initiative and developing plans for training and recruitment to develop these skills, as well as a more comprehensive analysis and prioritized plans for improving NWS facility conditions. The analyses will involve employees across the organization, including National Weather Service Employees Organization (NWSEO); consider current and emerging needs; identify gaps in capabilities and strategies to address them; evaluate the use of contractors; and consider fiscal costs. DOC requests these funds to conduct the foundational studies recommended by NAPA and establish actionable and defensible plans to modernize, and ultimately determine the optimal staffing, infrastructure, and facilities needs for an agile NWS capable of change. The focus is not on presumptions that the future NWS structure will be smaller OR larger than today, but on making informed decisions founded on solid information fully transparent to Congress, Executive branch agencies, and all stakeholders to continuously change NWS to best meet society's evolving needs.

c. The Weather Service. It states that the Weather Service does not have an effective and efficient means to identify science and technology requirements, procuring the respective components, and introducing them into operations. Do you agree with this statement?

Response: Yes, the current processes for identifying science and technology requirements, procuring the respective components, and introducing them into operations (referred to as R2O, or Research to Operations) is an ongoing challenge. As NAPA points out, improving R2O (and the reverse form of collaboration, Operations to Research (O2R)) will require improvements in collaboration with NOAA's Office of Oceanic and Atmospheric Research and the research community in general. Advances need to be implemented in testbeds or other transitional enablers earlier in the research and development cycle to accelerate R2O, and researchers need to be supported in using operational systems as the foundation of their research environment to complete the O2R cycle.

NOAA is making efforts to address this transition issue such as aligning the R2O management efforts internally to improve efficiency and effectiveness. NWS has proposed to restructure its budget in FY 2015 to include a budget line for Science and Technology Integration that provides a visibly managed NWS receptor for the research community to accelerate R2O.

4. **NOAA put out a Request for Information to industry to come up with ideas to help mitigate likely satellite gap on "sounding" data used in forecast models. But no similar request was made for imagery data -yet the imagery instrument is the biggest, mostly costly and most complex of the JPSS program. Why not?**

Response: The Request for Information (RFI) focused on the infrared and microwave sounding data, as these data are considered the most critical to the National Weather Service's Numerical Weather Prediction Models. Sounding data helps to predict severe weather events 3–7 days in advance when lives and property can be protected. Loss of sounding data increase the chance of missing severe weather events. The goal of the RFI was to explore and understand options for mitigating the possible loss of microwave and infrared sounding data provided by JPSS in the PM orbit. The RFI also requested ideas for overall life cycle cost reductions.

The sounders (ATMS and CrIS), as well as the Ozone Mapping and Profile Suite-Nadir (OMPS-N) and the JPSS imagery instrument, Visible Infrared Imaging Radiometer Suite (VIIRS) make up the suite of instruments that contribute to the current National Weather Service operational weather forecasts. The VIIRS instrument, while less critical to weather prediction models, provides higher, more consistent spatial imagery and substantially improved data collection in darkness, including imaging of the Arctic during the winter, important for ice detection, and the first ever operational capability for detecting harmful algal blooms impacting local coastal communities and marine life.

5. **NOAA commissioned a study authored by the Riverside Company examining the satellite data gap. The report recommended NOAA partner with China for polar weather data. Does NOAA plan to work with China on polar weather data?**

Response: The Department is not planning to obtain data from Chinese weather satellite programs.

6. **What are the key risks that could affect NOAA's cost and schedule commitments for the JPSS-1 and JPSS-2 satellites, and what is NOAA doing to address those risks?**

Response: JPSS implements an effective risk management process. Risks change frequently and have individual plans to ensure they are addressed. The JPSS-1 mission has been very successfully tracking its cost and schedule baseline. For JPSS-1, the large categories of risk are the remainder of instrument testing;

observatory integration and testing; Flight Segment and Ground Segment integration; integration with the launch vehicle; launch; and on-orbit commissioning. The track record of JPSS-1 to date demonstrates that the risk management process is working successfully. Many risks have been identified and tracked, and then either are mitigated or become issues that are then resolved. NOAA has addressed all risks and issues to date to ensure that the launch date stays on target. Together, NOAA and NASA's risk management process, which includes reserves, ensures we have the resources to rapidly and effectively deal with those risks that may turn into issues. Significant steps for risk reduction were taken for JPSS-1 based on the experience building, launching, operating Suomi NPP. The FY 2015 President's Budget request for JPSS ensures the program remains on schedule and within cost.

NOAA is working with NASA, its acquisition agent, to actively manage the risks of JPSS-2 and to finalize all cost and schedule commitments. All the JPSS-2 instruments are under letter contract and will soon have contractual schedule baselines established. The JPSS program is actively managing the supply chain for the instrument parts. The JPSS-2 spacecraft bus contracting process is underway and selection of a contractor will allow retirement of this risk. The launch service for the JPSS-2 spacecraft will be competitively sourced and placed under contract at the appropriate time, following NASA's launch services procurement processes. However, given the experience derived from the Suomi NPP and the ongoing assembly & test of JPSS-1, the JPSS Program believes that it is accounting for all of these risks in its JPSS-2 planning, and is using the same rigorous and proven risk management process described in the answer in regards to the question on JPSS-1

a. What is NOAA's strategy for ensuring continuity of data in the afternoon polar orbit after the JPSS-2 satellite?

Response: The Administration recognizes the need to build robustness into the JPSS program to maintain observations in the event of a loss of a satellite in the afternoon polar orbit and believes it is critically important to move forward on a path to improve JPSS robustness as early as practical.

NOAA and NASA are currently analyzing options to minimize the length of time in which the polar program is "one failure away from a gap" and to mitigate a gap, should one occur. The intent of this analysis is to determine viable options and strategies for bringing the program to a more robust posture as soon as possible. Options and strategies currently being considered to increase robustness of the JPSS Program include:

- .
- Implementing a robust sparing strategy for JPSS-2 CrIS and ATMS to protect the JPSS-2 schedule.
 - Now that the Justification for Other Than Full and Open Competition (JOFOC) has been approved, requests for proposals will be sent to the instrument contractors to include multiple ATMS and CrIS instruments in their contracts.
- Procuring JPSS-2 and the polar follow-on missions as an integrated program.
 - The final Spacecraft bus Request for Offers (RFO), which was released on August 13, 2014, includes a bus for JPSS-2, plus options for two additional buses.
-
- Examining options to mitigate the impact of catastrophic launch and/or JPSS-1 or -2 satellite failure, including:
 - A gap filler mission, with ATMS and CrIS instruments.
 - Mission with ATMS instrument only.
 - Ensuring robust Radio Occultation capability to augment/improve sounder performance.
 - Flight demonstration of a lower cost advanced technology microwave sounding instrument.
 - An RFI soliciting concepts for low cost gap filler alternatives was released and responses have been received.

- Assessing Advanced Technology concepts
 - Achieving a cost effective, budget-stable, state of the art high performing Future Enterprise will require a strong effort in Architecture planning which leverages Advanced Technologies and new business models.
 - Advanced Technology concepts include technology demonstrations that hold promise to build toward these goals.
 - NESDIS is considering a plan to deploy technology demonstrations periodically over the long term to prove capabilities of high potential to become elements of our future architecture. The purpose is to reduce risk of loss of continuity of observations.
- b. **How will NOAA use observing system simulation experiments (OSSE) or other methods to evaluate the most cost-effective solutions that will provide continuity?**

Response: NOAA is currently performing a suite of activities designed to determine the most cost-effective observing systems needed for mitigation of potential satellite gaps. These activities include Observing System Simulation Experiments (OSSE's), Data Denial Experiments (also called Observing System Experiments, OSEs), and cost/benefit comparisons of available observing strategies such as purchasing additional aircraft observations over sparsely sampled areas of the planet. OSSEs can be a useful tool that has potential to evaluate future observing systems and analyze if these systems will assist with satellite gap mitigation. OSSEs may have the capability to assess the potential impact of proposed/future observing systems on numerical weather, ocean, and climate prediction systems and to inform decision-makers prior to acquisition or construction of the proposed observing system. Currently, NOAA is performing two OSSEs to analyze possible gap mitigation from Global Positioning System Radio Occultation (GPS-RO) and geostationary hyperspectral sounder satellite data to improve numerical weather predictions. Additional OSSEs to evaluate possible gap mitigation from a geostationary microwave sounder, Doppler Wind Lidar, and enhanced use of reconnaissance aircraft and unmanned aerial systems are also planned.

7. **In a recent hearing with the Senate on April 10, the Commerce Secretary stated, "...what we're trying to do is move JPSS-2 so there's greater overlap with the JPSS-1 program. To do that, we need to have the procurement of the instruments, the bus, the ground system, and the launch." What is NOAA currently doing to accelerate JPSS-2? What is the status of the instruments, spacecraft bus, and ground system for JPSS-2?**

- a. **Will you please share with the committee the analysis NOAA has completed on accelerating JPSS-2 to address the potential data gap?**

Response: NOAA continues to analyze opportunities and associated costs to accelerate the JPSS-2 launch schedule and build improve robustness of the JPSS program to maintain observations in the event of a loss of a satellite in the afternoon polar orbit. In order to potentially accelerate JPSS-2 schedules, NOAA is pursuing a more robust sparing strategy for the ATMS and CrIS instruments, which are considered necessary to developing weather forecasts. The FY 2015 President's Budget request invests the resources needed to take the first critical steps to building robustness into the polar satellite program by beginning the purchase of copies of additional, critical long lead sub-assemblies and parts to support the build of spare ATMS and CrIS instruments. Implementation of this strategy enables options to protect the JPSS-2 schedules, thereby increasing likelihood of an overlap between the JPSS-1 and JPSS-2 missions.

The instruments for JPSS-2 define the critical path and long-lead parts are the pacing items. Without spares for these system elements, even a minor flaw or anomaly can result in months or years of schedule slip. NOAA has identified that such delays were contributors to cost growth and schedule delays in the

predecessor program. The status of JPSS-2 instruments (longest-lead items) is: VIIRS is under contract; ATMS, CrIS and OMPS are under letter contract and are under-going final contract definitization, which is expected to be completed this summer.

The JPSS-2 Spacecraft bus is being competed using NASA's Rapid Space Development Office's (RSDO) Rapid III for the delivery order and four qualified vendors participated in studies from November 2013 to April 2014. The Draft RFO was released May 30, 2014 for comment. The Final RFO was released on August 13, 2014 and will be awarded in April 2015. JPSS is redeveloping the Ground System inherited from NPOESS (currently utilized for Suomi NPP mission); the new Ground System is scheduled to be deployed by early 2016 and will be used by Suomi NPP, JPSS-1 and JPSS-2.

8. In January of 2013, Congress provided funds for NOAA to carry out Observing System Simulation Experiments on two specific commercial technologies. Unfortunately these studies won't be completed until the end of 2015. Why?

Response: NOAA received funds through the Disaster Relief Appropriations Act of 2013 to assist with determining the most cost-effective observing systems possible for the mitigation of potential satellite gaps. NOAA's current global Observing System Simulation Experiment (OSSE) system was developed in 2005 and does not reflect the current state of numerical weather prediction due to major advances in NOAA's operational data assimilation and significant increases in forecast model resolution. Due to the differences between this system and the current forecast models, analyses performed with the current OSSE system provide very limited information about the impact of new observing systems on predictions. This system is currently only used for limited OSSEs in order to provide primarily qualitative answers to observing system questions. Using funds provided by the Disaster Relief Appropriations Act of 2013, NOAA has begun a major effort to develop an advanced, next-generation OSSE system capable of providing accurate quantitative evaluations of proposed observing system modifications. This system will be online in late 2015.

In conjunction with this Disaster Relief Appropriation Act of 2013 funding, NOAA has been performing two specific OSSEs to analyze the potential satellite mitigation that would occur if Global Positioning System Radio Occultation (GPS-RO) and geostationary hyperspectral sounder satellite data are acquired. NOAA's evaluation process involves a multi-step assessment with preliminary data currently being acquired by limited OSSEs for both technologies. GPS-RO and geostationary hyperspectral sounder data potential will be further evaluated by the new, next-generation OSSE system (currently in development) and completion of these analyses is expected by the end of 2015.

9. The Director of National Weather Service has called GPS-Radio Occultation data "indispensable to our nation's weather forecasting models".

a. Given that a key source of this data-the COSMIC-I constellation-is already 3 years beyond its 5-year design life, how does NOAA plan to ensure continuity of radio occultation data through the most cost-effective solution(s)?

Response: NOAA, in partnership with Taiwan plans to fully implement COSMIC-2 to ensure continuity of radio occultation data. The FY 2015 President's Budget request supports the Global Navigation Satellite System Radio Occultation (GNSS RO) ground system, NOAA's contribution to the COSMIC-2 mission.

There are two COSMIC-2 launches planned for FY 2016 and FY 2018, respectively. NOAA partnered with the US Air Force (USAF) for the instruments and launch services for the launch of the first six satellites which will

be placed in equatorial low earth orbit (24 degree inclination). NOAA continues to seek solutions for instruments and launch services for the second six satellites which will be placed in a higher inclination low earth orbit (72 degree inclination). The two different orbits are necessary in order to meet the NOAA signed Level 1 Requirement Document for GNSS RO data, with the main requirements being 45 minute average data latency, global coverage, and over 8,000 soundings for the system per day.

- b. How much did the government spend (or donate "in-kind") to help Taiwan get the current experimental COSMIC-1 system into space and for NOAA's administrative and program support? Why did we do that, and what was the result?**

Response: COSMIC-1 is a joint Taiwan-U.S. partnership under an American Institute in Taiwan-Taipei Economic and Cultural Representative Office (AIT-TECRO) agreement. It has been carried out by the private sector in the U.S. with support from Taiwan and the United States. The United States, through the University Corporation for Atmospheric Research (UCAR), initiated the idea and proposed COSMIC-1 to Taiwan as an operational demonstration and research mission. Taiwan agreed to fund \$80 million of COSMIC-1 for the launch and operations for two years after launch and the United States contributed \$20 million, for a total cost of about \$100 million. COSMIC-1 was launched in April 2006 with a design life of 5 years, which lapsed in 2011. Taiwan and the U.S. have continued supporting COSMIC-1 through its extended operations. From 2008 through the present, the U.S. has contributed about \$5 million per year and Taiwan has contributed about \$7 million per year. U.S. support for COSMIC-1 has been provided by the National Science Foundation, NASA, and DoD (U.S. Air Force and U.S. Navy) in addition to NOAA.

COSMIC-1 has been a great success, with over 300 peer reviewed science papers published confirming its value. In addition, COSMIC-1 has proven that radio occultation is a major contributor to the NWS global model forecasts, as well as other international weather centers, typically ranking in the top five (out of more than 25) operational weather data systems. Taiwan's support for COSMIC-1 has been crucial to its success. It should be noted that out of the 2,395 registered users from 76 countries for COSMIC data, the United States is the country with the largest number of users, a total of 708 (30 percent), which is twice as many as Taiwan. These successes demonstrate the cost-effectiveness of international satellite partnerships such as COSMIC.

- c. The Committee understands that the Air Force and NOAA have agreed to support the government of Taiwan for COSMIC-2 satellites 1-6. What will be the total U.S. government cost to do that, including the value of the sensors and free launch donated by the Air Force, NOAA dedicated ground stations, and NOAA's annual administrative and operational costs?**

Response: Neither NOAA nor the USAF has provided any funding to Taiwan for the development of COSMIC-2 satellites. Taiwan is providing approximately \$210 million worth of satellites to the joint project in order to accomplish the mission that flies three U.S. payloads on the first six satellites, and one U.S. payload on the second six satellites. The highly leveraged international partnership for COSMIC-2 is of great benefit to the United States at an extremely low cost for a satellite constellation mission.

The USAF built the payloads that will be used on COSMIC-2 as part of another program called Space Situational Awareness and Environmental Monitoring. As part of their contribution to the international collaboration, and in order to get their USAF payloads safely launched, the USAF is providing rideshare space on a SpaceX launch vehicle, which was fully funded under a USAF demonstration project – STP2 – along with over 15 other satellites. The estimated total USAF contribution for the first launch is approximately \$120 million (including the sensors and launch). The Committee should approach the USAF for exact contributions to COSMIC-2.

NOAA's contribution to this mission is approximately \$66.4 million over 10 years for data reception and processing in order to use this valuable data for U.S. weather forecasting.

10. What is the lifecycle cost of the GOES-R program? What amount of FY15 funding is dedicated specifically to preventing a satellite gap prior to the launch of the first GOES-R satellite?

Response: The current (FY 2015 President's Budget) Life Cycle Cost estimate for the GOES-R series is \$10,829.5 million. The total FY 2015 President's Budget will be used for GOES-R Series satellite development. No funds are being spent on gap mitigation for GOES-R.

11. Why is the FY15 requested amount for the GOES-R program more than \$30 million higher than the FY14 requested amount?

Response: The cost profile of major acquisition programs vary from year to year. In FY 2015, funding would be used to maintain instruments, satellite, and ground system developments that are all currently under contract in order to meet the launch commitment dates of the 2nd Quarter FY 2016 for GOES-R and 3rd Quarter FY 2017 for GOES-S. The funds will also be used to continue the development activities for GOES-T and -U to maintain their launch schedules.

The period between FY 2015 and FY 2017 is the most critical period of time in the program's development. In FY 2015, the GOES-R spacecraft will complete Integration & Test (I&T), ship the integrated spacecraft to the launch base, and initiate launch processing. The Ground Segment will complete final I&T activities including critical interface testing with the GOES-R spacecraft and external interfaces, as well as final certification and validation testing for operations. Additionally, GOES-S will be starting satellite-level I&T activities.

FY 2015 funding will support:

- Completion of GOES-R satellite, ground system, and flight-to-ground integration and test activities;
- Begin GOES-R satellite pre-ship, ship, launch base activities, and GOES-R launch service activities, including launch vehicle integration and test;
- Delivery of GOES-S suite of instruments: Advanced Baseline Imager (ABI), Solar Ultra Violet Imager (SUVI), Extreme Ultra Violet /X-Ray Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS), Geostationary Lightning Mapper (GLM), and Magnetometer;
- Completion of fabrication of GOES-S spacecraft hardware and initiation of satellite-level integration;
- GOES-S launch service activities; and
- Continue fabrication, assembly, and integration of GOES T&U instruments and spacecraft hardware.

12. Of the \$5.5 billion requested for NOAA, how much will be devoted to carrying out the President's Climate Action Plan?

Response: One of NOAA's mission essential functions is to provide science, data, and information that Americans want and need to understand how climate conditions are changing. Americans' health, security and economic wellbeing are tied to climate and weather. Without NOAA's long-term climate observing, monitoring, research, and modeling capabilities we couldn't quantify where and how climate conditions have changed, or predict where and how they're likely to change. In the FY 2015 President's Request, NOAA is not requesting any funding specifically devoted to carrying out the President's Climate Action Plan. However,

many of NOAA's existing climate and weather programs do align with priority actions outlined in the Plan to include the Greenhouse Gas Monitoring and Climate Resilience Toolkit initiatives.

13. In January of 2013, NOAA received a substantial transfusion as part of the Superstorm Sandy supplemental appropriations. Has your agency spent all of those funds? If not, why not?

Response: NOAA received approximately \$310 million as part of the Sandy Supplemental appropriation. As of the end of June 2014, NOAA has obligated \$161 million, about 47 percent of those funds. NOAA plans to obligate the majority of remaining funds by the end of FY 2014. Some projects, such as fine grain High Performance Computing (HPC) architectures and the P-3 aircraft re-winging will continue to have obligations into FY 2015.

14. As you select a new leader of the satellite division, how do you plan to select someone who can control costs? Can you promise me that the next head of this office will not be hostile toward private sector opportunities?

Response: NOAA, with the support of an executive search firm experienced with other NOAA/NESDIS recruitments, advertised the vacancy to attract a broad field of candidates. NOAA senior leaders will closely review candidates' skills and experience against the executive and professional-technical qualification criteria to identify the best qualified pool of candidates. NOAA is committed to selecting a candidate who will prioritize meeting our observational requirements on time and as cost effectively as possible, to include making optimal use of solutions in the public and private sector that meet NOAA's requirements for quality, timeliness, and reliability.

15. How does the NOAA budget strike a balance between internal research that stays at NOAA and extramural research that goes out to NOAA's private and academic partners? Does the way the FY15 budget handles this balance change in this year compared to past years?

a. Historically, has a larger proportion of each line office's research money been provided extramurally to universities, NOAA's Research office, or the Weather Service?

Response: Historically, approximately 60 percent of NOAA's budget is obligated as contracts, grants, and other agreements. NOAA's FY15 President's Budget continues to seek the right balance between internal and external investments. NOAA could not accomplish its mission as effectively without partners in state/local governments, industry, academia, non-profits. In FY15, we will continue to leverage external partnerships to provide the environmental intelligence that millions of Americans rely on.

16. Of the \$5.5 billion requested for NOAA, how much will be devoted to carrying out the President's National Ocean Policy?

Response: None of the funds requested are explicitly devoted to carrying out the President's National Ocean Policy. NOAA, like other National Ocean Council Agencies, has a number of existing programs and resources committed to ocean related management activities, missions, and objectives under existing authorizations or other legislation. The National Ocean Policy does not alter, replace, or extend these existing funding commitments or directives. Rather it helps to better focus and leverages these existing, limited resources and allows for more efficient use of taxpayer dollars by improving coordination and collaboration, and identifying clear priorities and associated actions.

17. **High performance computing is a critical asset for enhancing today's weather forecast and for transitioning even better forecast models from research into operations. After Hurricane Sandy, Congress made available certain short-term funding to enhance NOAA's high performance computing. What is NOAA's long-term strategy for ensuring that there is adequate supercomputing for both operations and research and how is this reflected in the agency's FY 2015 budget request?**

Response: NOAA is committed to providing High Performance Computing (HPC) capacity for both operations and research. A significant increase in R&D HPC capacity will become available to users in March 2015 as a result of the Sandy Supplemental project. In addition, in NOAA's FY 2015 budget, \$3 million is requested for software development work, which will position NOAA to take advantage of advances in HPC technology. There will be a significant increase in operational supercomputing capacity in FY 2015 as part of regularly scheduled upgrades.

18. **I understand that NOAA's Climate Portal - Climate.Gov -includes non-peer reviewed material, some of which is highly unscientific, alarmist, and designed for classroom instruction. Why is NOAA disseminating this information?**

Response: All material published on NOAA Climate.gov is based upon sound science, and all of the site's material is reviewed and approved by scientists and subject matter experts prior to publication. NOAA disseminates climate science data, information, and tools in response to the American public's rapidly growing needs and demands for it; and in response to congressional mandates directing NOAA to advance understanding of Earth's climate system and to share the resulting data and information with the public.

19. **There have been many troubling recent reports about the process of developing the United Nations' Fifth Assessment Report, including participating scientists describing significant political censorship. How many NOAA employees were involved in the Intergovernmental Panel on Climate Change (IPCC) fifth assessment report?**

- a. Will you provide a complete list of NOAA personnel and any edits or comments submitted as part of the development of the Working I, II, and III reports and their respective Summaries for Policymakers?

Response: The following NOAA employees were coordinating lead authors, lead authors, and reviewers as part of the IPCC Fifth Assessment Expert Review process. NOAA employees who participate in the IPCC Expert Review process represent themselves as subject matter experts in their field and do not represent NOAA or the U.S. Government.

The expert review comments and edits were submitted by NOAA personnel directly to the IPCC or to lead authors. Many comments have been or will be made public by the IPCC after the release of the reports. The comments submitted via government review will be made public as comments of the U.S. government.

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 Chris Sabine

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Michael Brewer
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Thomas Karl
Brent Lofgren
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Robert Portman
V. Ramaswamy
A.R. Ravishankara (Retired)
Karen Rosenlof
Pieter Tans

20. Has NOAA been involved in the development of a social cost of carbon?

- a. If yes, will you provide us a complete list of all NOAA personnel, all meetings attended, and all comments provided during the development of an interagency social cost of carbon from 2009 to present?**

Response: Yes, NOAA participated in the interagency working group that developed the social cost of carbon. The working group's methodology and conclusions are documented in the 2010 and 2013 Technical Support Documents.

21. What evidence do you have that NOAA climate models can skillfully predict CHANGES in regional climate statistics on multi-decadal time scales when the models are run for the last several decades WITHOUT any observational data being used to constrain their forecasts?

Response: All NOAA climate models rely on observations throughout the modeling process. In particular, observational data is used to inform our choices of climate drivers in multi-decadal projections.

Global climate models are mathematical representations of the processes influencing the atmosphere, land, oceans, ice and biosphere. Scientists observe and measure the factors that are known to influence the Earth's climate, such as ocean currents, salinity, wave energy, air temperature, and precipitation. They use that knowledge combined with basic physics principles to create a computer simulation of the planet, known as a global climate model. Modelers represent Earth's surface and atmosphere as a virtual grid, where the world is made up of interacting three-dimensional boxes. Mathematical equations are used to resolve the physical characteristics and processes within each box, along with calculating interactions and influence between boxes, ensuring that conservation principles of energy, mass, and momentum are satisfied. The smaller the three-dimensional boxes, the higher the spatial resolution of the model. These calculations, also known as model runs, are completed many times to simulate past and/or predict future climate variables.

Observations are essential to climate model development, simulations, and testing. When simulating past and present climates, we determine the external factors that force the climate system based in part on observations. These external factors include changes in the sun's output and volcanoes, as well as human activities, such as the emission of greenhouse gases, pollution, and land-use changes. Model simulations are verified by comparing results to observations such as temperature and precipitation. When projecting future climate on multi-decadal time scales, external forcing factors must also be used, and these play a key role in the skill (measure of the model's forecast error and accuracy) of multi-decadal projections. Many different climate scenarios can be explored based on the choice of natural forcing (e.g., how many volcanoes erupt in the next 30 years) and levels of human activities (e.g., will we reduce the pollution emitted into the atmosphere), but all combinations of forcing factors used are limited to realistic future scenarios.

NOAA scientists are advancing scientific understanding of climate and its variations and impacts, and improving NOAA's predictive capabilities, through the development and use of world-leading climate models. Some examples of recent studies are below.

Model prediction of observed changes in South Asian Monsoon

The South Asian summer monsoon is an important part of the global water cycle, which provides about 80 percent of the region's annual precipitation and touches the lives of more than 20 percent of the world's population. A recent study using the NOAA Geophysical Fluid Dynamics Laboratory (GFDL) state-of-the-art global climate model CM3 investigated what caused the observed decrease in the South Asian summer monsoon rainfall over the second half of the 20th century⁵. The model accounted for all the known natural and anthropogenic forcings by using observed increases in stratospheric aerosols from major volcanic eruptions, concentrations of long-lived greenhouse gases, land-use changes, and data on emissions of precursors to pollutants such as ozone and aerosols. It was found that the observed drying trend of the South Asian summer monsoon was of anthropogenic origin and attributed to increased aerosols, as opposed to human-influenced greenhouse gas emissions. Observations, theory, and model simulations highlighted the prominent role of aerosols in altering regional climate, and enhanced our confidence in the understanding of recent past climate and model projections of future multi-decadal climate changes for emissions scenarios.

Model prediction of multi-decadal decline in Australian precipitation

There has been a marked decline in winter season precipitation over parts of southern Australia in recent decades, with substantial societal impacts. This issue is explored in a new study using a high-resolution climate model recently developed at GFDL⁶. The high-spatial resolution of the model, enabled by

⁵ Bollasina, Massimo, Yi Ming, and V Ramaswamy, October 2011: Anthropogenic aerosols and the weakening of the South Asian summer monsoon. *Science*, 334(6055), DOI:10.1126/science.1204994.

⁶ Delworth and Zeng, 2014, Regional rainfall decline in Australia attributed to anthropogenic greenhouse gases and ozone levels,

additional supercomputing resources made available to NOAA/GFDL, allows a far more accurate simulation of regional precipitation than in previous generations of models, thereby also helping to create more accurate simulation of the changes in precipitation in response to changes in atmospheric composition.

The study results show that at the observed regional scale, multi-decadal precipitation declines are well simulated by this model as a response to increases in long-lived greenhouse gases and decreases in stratospheric ozone. Physically, both changes tend to modify the large-scale atmospheric circulation in ways that dry parts of southern Australia, especially southwestern Australia. One key mechanism is that winter storms, which are an important source of precipitation in southern Australia, are moving more poleward in response to increasing greenhouse gases and reduced stratospheric ozone, thereby bringing less precipitation to parts of southern Australia. The same model projects that this trend will continue and amplify in the future.

22. How skillful are the multi-decadal climate model predictions of changes in major atmospheric and ocean circulations such as El Nino, La Nina, the North Pacific Decadal Oscillation, etc.? These circulation features, much more than a global average surface temperature anomaly, are central to whether a region has drought, flood and other major weather event.

Response: Successful simulation of the Earth's climate, including phenomena such as El Nino Southern Oscillation (ENSO) or Pacific Decadal Oscillation (PDO), requires comprehensive climate models that embody our deep understanding of the Earth, derived from an accurate long-term baseline of atmospheric and ocean observations. The success of simulating these phenomena on multi-decadal time scales varies depending on the climate phenomenon. For example, predicting ENSO on multi-decadal timescales is very difficult for a number of reasons, including the lack of information about its past behavior. Good observations for the factors that control ENSO behavior, such as subsurface temperature and current fluctuations, are only available starting in the late 1970s. State-of-the-art climate model simulations can generate major ENSO events and its characteristics based on known climate drivers, but accurate predictability on decadal time scales is still not possible with current models. Research to improve the models and harness observations will extend lead time beyond current capabilities. In particular, NOAA/GFDL scientists are pursuing a vigorous research program to understand exactly what influences ENSO, and its predictability, at seasonal to multi-decadal time scales. Though ENSO events are not yet predictable on the multi-decadal timescales, predicting ENSO events with state of the art multi-model systems out to six-months starting in the summer has been done successfully at NOAA.

Even though phenomena with relatively short timescales (from weather to ENSO) are difficult to predict at multi-decadal time scales, longer lasting phenomena that depend on deep ocean circulation may be more predictable. The Atlantic Multidecadal Oscillation (AMO) is one example of an ocean circulation feature that NOAA has had success in modeling and predicting on multi-decadal time scales. The AMO is characterized by a pattern of warming and cooling of sea surface temperature that extends across the entire North Atlantic, with multi-decadal variations. These persistent changes in North Atlantic sea surface temperature have a substantial influence on many aspects of the climate system, including drought over North America and Africa, as well as Atlantic hurricane activity.

A sustained research effort over several years has led to the development of an experimental prediction system that was designed to predict AMO fluctuations of sea surface temperature. The GFDL decadal prediction

system has verified skill (measure of the model's forecast error and accuracy) in predicting Atlantic Ocean sea surface temperature changes several years to nearly a decade in advance. This skill largely comes from an ability to predict decadal scale changes in ocean circulation that lead to either more or less heat being carried by the ocean from the warm Tropics to the cooler regions of the subpolar North Atlantic. Ongoing research seeks to improve model prediction capabilities of AMO fluctuations in sea surface temperature through a better understanding of the inherent mechanisms underlying this predictability, and through developing improved computer models that better capture climate processes.

23. Please outline which fleet investments in FY2015 budget request are within the regular budget and which would be included as the Growth, Opportunity, and Security Initiative.

Response: The FY 2015 budget request provides \$244.0 million for OMAO, including \$175.0 million for marine operations, \$31.6 million for aviation operations, and \$7.2 million for ship capital improvements and technology infusion. The Growth, Opportunity, and Security Initiative included funding to support construction of one new Ocean Survey Vessel (OSV).

24. Please provide us with probabilistic projections of the likelihood and length of a JPSS gap as of May 2014.

Response: The probabilistic projections of constellation availability that support risk assessments continuously vary and have significant caveats / limitations. NOAA would welcome the opportunity to provide an in-person briefing on this topic.

25. What potential NOAA systems would be impacted by the sale of IBM's Server Unit?

Response: NOAA currently uses IBM x86 servers for the following systems: Geostationary Operational Environmental Satellites - R Series (GOES-R), Joint Polar Satellite System (JPSS), Government Resource for Algorithm Verification (GRAVITE), Weather and Climate Operational Supercomputer System (WCOS), Research & Development High Performance Computing System (R&D HPCS), and Comprehensive Large Array-Data Stewardship System (CLASS).

26. Does NOAA develop or fund any scientific studies or analysis for which the underlying data is not transparent in a manner sufficient for independent analysis and replication?

Response: NOAA does not develop or fund scientific studies or analyses for which the underlying data is not transparent in a manner sufficient for independent analysis and replication. NOAA is committed to scientific rigor and quality for all scientific studies and analyses and continuously takes steps to ensure that its research and analyses are in compliance with the Data Quality Act. In addition, NOAA scientists and contractors adhere to NOAA's Administrative Order on Scientific Integrity (NAO 202-735D). This Order promotes and establishes a policy on scientific integrity for the agency, establishes a Code of Scientific Conduct and a Code of Ethics for Science Supervision and Management, provides compliance training, and sets up procedures for resolving allegations of misconduct. Adherence to this Scientific Integrity NAO strengthens confidence in the quality, validity, and reliability of NOAA science.

27. For research and modeling activities of atmospheric conditions that may be both within 2 weeks or

over longer timescales, how does NOAA classify these activities as weather or climate for budgetary purposes?

Response: Given the interconnectedness of our earth system and the strong connectivity across climate, weather, and oceans research, many of NOAA's Office of Oceanic and Atmospheric Research (OAR)'s laboratories conduct a variety of research projects within the weather to climate spectrum. As a result, many of OAR's laboratories receive funding from both the "Weather and Air Chemistry Research" and the "Climate Research" Laboratories and Cooperative Institutes Program, Project, and Activity (PPA) budget lines. Research funded through the Climate Research PPAs refers to studies occurring on atmospheric conditions over longer timescales from months to years and beyond. Research funded through Weather and Air Chemistry Research PPAs is generally used for shorter timescale research. Both climate and weather research require observations, which are typically funded from the PPA most relevant to the research goals. Weather and climate analyses are part of a continuous spectrum of research and measuring atmospheric conditions on short- and longer-term time scales are vital for input into both weather and climate models and forecasts.

28. During the hearing you stated that the, "only proven viable capabilities in hand to attain GPS Radio Occultation data in the 2016 timeframe," is Cosmic-2. What other unproven or unviable capabilities has NOAA decided are not worth pursuing?

Response: NOAA has seen preliminary plans and proposals for a follow-on mission to COSMIC-1 but currently believes that COSMIC-2 is the best option for the U.S. taxpayer because it is well planned and low risk, building upon the demonstrated success and heritage of COSMIC-1, which is a proven system, and leverages Taiwan's contribution of approximately half of the costs of the entire mission. Another advantage of COSMIC-2 is that the COSMIC-2 data is free and open to all users. Given the success of COSMIC-1 and the advancements planned for COSMIC-2, NOAA believes pursuing untested and unproven commercial RO data purchases at this time would pose greater risk to operational use of RO data.

29. Has NOAA received proposals to purchase commercial data that have included provisions to ensure access to data as a public good?

Response: NOAA has received several proposals to purchase commercial satellite data. NOAA is still reviewing whether these proposals contain adequate provisions to ensure access to data as a public good and will provide guidance that better defines data access requirements.

30. You stated during your testimony that, "our best scientists within NOAA are very cautious and leery about attributing specific extreme weather events to climate change ...the challenge of attribution is difficult." Why does the National Climate Assessment point to events – like drought conditions in Texas - as evidence that climate change is happening now?

Response: NOAA's cautious approach to attributing specific weather events to climate change is consistent with the text from the body of the National Climate Assessment (NCA) report: see CHAPTER 2: OUR CHANGING CLIMATE, Page 38 – "The summer 2011 heat wave and drought in Texas was primarily driven by precipitation deficits, but the human contribution to climate change approximately doubled the probability that the heat was record-breaking. So while an event such as this Texas heat wave and drought could be triggered by a naturally occurring event such as a deficit in precipitation, the chances for record-breaking

temperature extremes have increased and will continue to increase as the global climate warms.” The language in the report’s technical assessment is consistent with our scientific findings and my testimony.

HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE, SPACE, AND
TECHNOLOGY
Subcommittee on Environment

Hearing Questions for the Record
The Honorable Suzanne Bonamici

*An Overview of the National Oceanic and Atmospheric Administration Budget
Request for Fiscal Year 2015*

The Honorable Kathryn Sullivan

1. As you know, Jason-3, the next satellite to provide precise measurements of the height of the sea surface, was underfunded in FY14. It is my understanding that NOAA's European partners have indicated that if Jason-3 is not launched next year that they will be forced to cancel the program. The budget request includes an increase of \$7 million, a total of \$25 million, for Jason-3 to develop and initiate a re-plan. It seems as if this request will be too little too late if NOAA's European partners are forced to cancel their portion of the program.

a. Can you please describe the need and benefits of ocean altimetry data?

Response: The Jason-3 Altimetry mission is needed to provide continuity of precise measurement of sea surface heights for applications in the areas of Ocean Climatology and Ocean Weather.

Ocean Weather Benefits From Space Based Altimetry:

- Operational Oceanography: Accurate global ocean modeling is critical to NOAA's ability to provide real time and prognostic information on the state of the ocean. Whether predicting the path of an oil spill, locating stranded mariners in search and rescue operations, or tracking harmful algal blooms along coastlines, NOAA depends upon accurate ocean models initialized with Jason satellite altimetry data.
- Surface wave and wind speed forecasting and monitoring: Accurate surface wave and wind forecasts are a major requirement for offshore operators. Over the last decade altimeter-derived significant wave height and ocean surface wind speed data have been critical for improvements in maritime monitoring and prediction systems. The US Navy also makes use of altimetry data for their operations.
- Hurricane intensity forecasting: Ocean Heat Content (OHC) is estimated using sea surface height anomalies from altimetry. The knowledge of the upper ocean heat content is a critical factor in forecasting the intensity of hurricanes as they approach the U.S. east and Gulf coasts where high OHC is quite variable. One example is the National Hurricane Center, which uses Jason data to derive ocean heat content to improve hurricane intensity forecasting as much as three days in advance.
- Search and Rescue: The U.S. Coast Guard (USCG) Search and Rescue uses Jason-derived surface currents to plan time critical search patterns. Knowing the currents allows USCG to narrow-down search zones, improving response times, saving lives, property and operational costs.

- Energy Siting Purposes: Derived surface currents are used in the siting of off-shore facilities, like oil platforms and ocean wind power farms.
- Coastal variability and its impact on ecosystems: Satellite altimetry provides observations for modeling the ocean basin and the broader coastal area. Coastal forecasting is needed in responding to environmental problems, such as oil spills and harmful algae blooms, as well as forecasting tides and currents important to commercial shipping.

Ocean Climatology Benefits From Space Based Altimetry:

- Global sea-level rise: This is a fundamental indicator of climate change. An altimeter time series of several decades will be needed to distinguish signals related to anthropogenic (human impact) warming from those related to natural variability, as well as to clarify whether the rate of sea-level rise is accelerating.
- Regional sea-level change: The regional expression of sea level change is highly variable due to the presence of regional wind variability and other processes. Jason altimetry provides the spatial coverage needed to distinguish regional from global processes, information essential for improving local projections.
- Decadal variability in the ocean: This has been shown to have an impact on fishery regime changes and correlates with droughts on land and changes in hurricane activity.
- Seasonal/inter-annual variability: On seasonal to inter-annual timescales, ocean-atmosphere interactions in the tropical Pacific, the El Niño / Southern Oscillation (ENSO) phenomena, currently provide much of the signal for seasonal forecasts.

b. What capabilities will be lost or weakened if collection of this data is stopped or interrupted?

Response: The capability to make more accurate weather predictions over land and ocean, from hurricane intensity forecasting to inter-annual events such as El Niño and La Niña will be weakened. In addition, ocean weather models, in some cases, will be substantially degraded and in others – such as those used in search & rescue and oil spill response - cease functioning if altimetry observations are not available, putting lives and property at risk.

c. Who are the end users of this data and the products NOAA develops using ocean altimetry measurements?

Response: The end users of Jason data and the products NOAA develops using ocean altimetry measurements are as follows:

- Hurricane Forecasting: End Users – National Weather Service (NWS), Federal Emergency Management Agency (FEMA), Department of Homeland Security (DHS), U.S. Navy, news organizations, state and local disaster managers.
- High Wave Warnings: End Users – USCG, U.S. Navy, NWS, commercial ship operators, cruise ship operators, commercial fisherman, offshore oil platform operators, Federal and State coastal managers.

- Fisheries and Trust Species Management: End Users – NMFS, State agencies, Sea Grant Institutions, management councils.
 - Ocean Hypoxia Dead Zones: End Users – Federal and State coastal managers, academia, Sea Grant Institutions.
 - Search and Rescue: End Users – Federal and state agencies, and private companies.
 - Off-Shore Operations: End Users – oil industry and private oceanographic service providers.
 - Oil Spill Response: End users – Federal agencies (e.g., NOAA, FEMA, EPA), state agencies, and private oceanographic service providers.
 - Fishing Services: End Users – commercial ocean service providers, commercial and recreational fishermen.
 - Energy Siting Purposes: End Users – Federal agencies (e.g., NOAA, Department of Energy, Bureau of Ocean Energy Management), State agencies, and private oceanographic service providers.
2. **The Oregon Coast has a long and vibrant history of commercial fishing. Fishing communities have undergone substantial changes in recent years, from development and adoption of new gear technologies to catch share and individual quota systems. As the fishing community take steps to make fisheries more sustainable, so too must management agencies do their part to improve and adopt best management practices. This means more transparency, more accurate stock assessments, and better cooperation between NOAA and fishing communities.**

We know better data can lead to better management. I'm aware of a number of efforts that could go a long way to enhance data collection and sharing, thereby improving forecasting and management of ocean resources. One such effort is Project CROOS out of Oregon State University that aims, among other things, to develop Genetic Stock Identification to provide more precise analysis of distribution patterns for Chinook salmon than is available through the present coded wire tags system. Efforts like this could help fishers target healthy fish populations while avoiding weaker stocks. Better understanding of distribution patterns and more accurate stock assessments would help us protect the resource and ecosystem and reduce any excessive restrictions on fishing.

We all know funding is tight. Demands for better fisheries data coincide with budget appropriations for data that are flat or declining. Monitoring, while essential, is also costly. With that in mind, what is the agency doing to evaluate and incorporate more cost-effective alternative management strategies that improve the efficiency and effectiveness of stock assessments and fisheries management?

Response: Several important efforts are currently underway that will advance the strategic management of NOAA Fisheries stock assessment program. First, NOAA Fisheries is on the verge of implementing a newly developed fish stock assessment prioritization process. The prioritization process will provide a consistent approach for establishing assessment priorities in each region. By considering numerous stock and fishery attributes, the process will determine stocks in need of assessment, and set target assessment frequencies and levels for each stock. Important gaps in data collection or analysis will be identified, and for certain stocks, assessment efforts may be reduced. Overall, the prioritization process aims to achieve the right balance of stock assessment efforts in all regions and will allow NOAA Fisheries to take a more

strategic approach to allocating resources. NOAA aims to implement this process in 2015, but testing on subsets of managed stocks will begin this summer to determine if refinement is needed before full implementation.

NOAA Fisheries is also currently developing a new Stock Assessment Improvement Plan (SAIP). Through this exercise, NOAA Fisheries is looking holistically at the stock assessment program and is creating a vision of the next generation stock assessment framework. The prioritization process will be an important component of the framework, but the SAIP will touch upon numerous elements of the assessment program with the goal of finding a good balance between timeliness, efficiency, and thoroughness. For instance, advanced sampling technologies and electronic monitoring can augment current fish stock surveys and fishery catch monitoring. These developments could expand the total amount of data collected without requiring additional resources.

In addition, the people who fish our oceans have extensive experience and knowledge about fisheries resources. Leaving this information on the table would be disadvantageous and reduce our ability to sustainably manage stocks. What is the agency doing to make use of the fishing community's experiential knowledge of ocean resources and how is that information being incorporated into management decisions?

Response: There are several key ways that fishermen provide information and expertise that affect fishery management. Many members of the Regional Fishery Management Councils are fishermen and can bring their experience directly into the Council discussions on fishery management plans and regulations. The Councils have advisory panels with broad representation from the fishing communities that provide valuable advice and perspective and have a direct effect on fishery management policies. Fishermen participate in Council meetings, providing their experience through testimony on issues before the Council. NOAA has long utilized cooperative research, directly involving fishermen in the design and conduct of research on things like stock abundance, bycatch, and gear design. Anecdotal information from fishermen can indicate stock and ecosystem changes that warrant more rigorous study through scientific research programs. In many fisheries, fishermen also provide valuable data through logbook programs. For example, fisher logbook data plays a significant role in stock assessments of highly migratory species.

Appendix II

ADDITIONAL MATERIAL FOR THE RECORD

SUBMITTED STATEMENT OF COMMITTEE RANKING MEMBER EDDIE BERNICE JOHNSON

Thank you Mr. Chairman. I would first like to take this opportunity to congratulate Dr. Sullivan. She has appeared before our Committee several times, and I am pleased that the Senate has confirmed her as Administrator of the National Oceanic and Atmospheric Administration. I look forward to a productive discussion of the Administration's FY15 budget request for NOAA at today's hearing.

As we all know, NOAA's scientific research conducted in support of weather forecasting, fishery management, and coastal resiliency plays a critical role in enhancing our understanding of the environment and ensuring a strong economy. Underpinning many of these efforts are programs that focus on addressing the challenges of climate change, such as rising sea levels, changes in ocean chemistry and ecosystems, and more severe weather. Cutting edge research conducted by the agency is necessary to ensure our communities are prepared for the very real challenges brought on by a changing climate.

In fact, many of my colleagues on this Committee come from States which are now facing the impacts of our changing climate. Droughts in Texas and California have put an increased, and in some instances unparalleled, strain on local and regional economies, and on the overall public health and welfare of our citizens. Our coastal communities face pressing challenges presented by rising sea-levels, to say nothing of the enormous threat posed by more severe hurricanes.

Sadly, even this week, dozens of people have lost their lives as a result of tornados in the Midwest and South, and more than 75 million people were dealing with the threat of severe weather in States like Alabama, Mississippi, and Oklahoma.

One of the agencies the American people turn to is NOAA for critical information before, during, and after these severe events. Whether it is providing forecasts and warnings of pending storms, working with state or local decision makers to develop effective response strategies, or conducting research that improves our understanding of severe weather to enhance the resiliency of our communities, it is essential that we maintain our commitment to the science done at NOAA.

Mr. Chairman, the list of industries, local agencies, States, and Nations that take climate change seriously is growing rapidly and without end. It is long past time that we—in Congress—take it seriously too. I am happy to see that the President's budget request for NOAA emphasizes the agency's critical role in helping the United States act on climate change. I look forward to discussing these efforts, as well as the other important initiatives and programs that are contained in NOAA's proposed budget. Thank you, Mr. Chairman and I yield back the balance of my time.

